JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Looking Forward in London.

To prophesy is to tread on dangerous ground; and we have no intention of committing ourselves. But the final report of the Royal Commission on the Traffic of London has now been issued; and it is interesting to examine their predictions and recommendations from the point of view of their effect on the gas supply of London, if ultimately there should be fulfilment. The Royal Commission have been engaged on their stupendous task for some three-and-a-half years; and the quantity of printed matter they have issued is commensurate with the heavy and responsible labour involved by the reference to them. The reference had regard not only to the present but to the future. The difficulties of the present have a self-evidence that brooks of no denial; but about the future there is an amount of vagueness, and must be of speculation, from which the Commissioners, with admirable fidelity, do not flee. In looking to the future, however, they do not appear to have taken sufficient account of modern influences, which may have a material retarding effect upon the prospective growth of the Metropolis. The trade of the docks of London is not what it used to be; and the tendency of manufacturing industries that are not inseparable from London is to migrate to more congenial quarters of the country, using London merely as a commercial base. The Hybrid Committee on Electricity Supply have taken count of the springing up of industries beyond the boundary lines of the Administrative County of London, and give this as a reason why, for successful development, any electricity power scheme for London should be suffered to go a distance outside. The high rates of London are contributing to this industrial migration; and it is becoming more and more questionable whether the pace of the expansion of future London will be the pace of the past. No one can tell; and therefore if the Commissioners have erred at all, they have done so on the right side in taking a broad view of the productiveness and consequent requirements of the London of the future.

Regarding the Metropolis as it exists, we know that its streets are too narrow; that at the height of its daily traffic the main streets are congested; that the regulation of the myriads of vehicles and pedestrians has become quite a work of art with the police (and thoroughly well they do it); and that there are no less than 42 authorities who have power to open the streets in the 118 square miles constituting the Administrative County of London. That is the London that exists. But the London of the future is—supposing that no influences external to those present with the Commissioners come to upset their calculations—an altogether different thing, as that London is delineated from existing conditions combined with imagination. Allowing the probability of the consummation of the Commissioners' views and predictions, the fulfilment would have an important effect on the future of London's gas supply. The Commissioners depict a Greater London extending some 15 miles in all directions from Charing Cross, and containing an area of 692 square miles. That area is at present inhabited by 6½ millions of people; and a population of 11 millions is foreshadowed by 1931. This raises visions of an immense augmentation of the number of consumers for the Gas Companies supplying within that area. But supposing—it is all supposition—that all things fall in correctly with the plans of the Commissioners, and that those plans are perfected, the benefit in this respect will be greater for the Suburban Gas Companies than for the Metropolitan ones. This is worth inquiry on the premisses supplied by the report.

The Commissioners allege—though not in such few words—that the means of communication from London with the suburbs 10 or 15 miles out are arrantly defective and insufficient. This, of course, has been largely brought about not only by the increase of population, but by the exodus of residents from Inner London; so much so that the Railway Companies, with the competition of the electrical trams, find that it is growing less and less profitable to maintain and keep open some of the stations nearest to their Metropolitan termini, which stations were at one time valuable tributaries of their systems. People of means, excepting those who can afford to have both a west-end and a country residence, have long since taken their departure from London to reside in the suburbs and beyond; and now the Commissioners suggest that one of the remedies for the relief of London is such improvement in railway and tramway facilities—more particularly the extension of electric tramways—that the workers of London can be whisked (in fifteen to twenty minutes, and at frequent intervals) morning and night from and to homes that are situated on all sides some 10 to 15 miles from the centre of London. The provision of such facilities would automatically produce still further extensions of that night depopulation of London which commenced a few generations ago in the City, spread westward and to less extent eastward, and has well-defined example south of the Thames. Concurrently, there has been a tendency for the professional man, the manufacturer, and the merchant, to place greater distances than formerly obtained between his offices, manufactory, and business premises and his family residence. This has had in certain districts a changing effect in the quantity and period of gas consumption; at any rate, the character of the gas business in those areas must now be different from that which would obtain if the old residential conditions had survived. In the City, for example, after the day consumption in summer has ended, the lighting consumption must be singularly light in relation to the amount of property compressed into the area; while in the winter, the lighting, heating, and industrial business in gas must be very heavy during working and business hours, compared with the later evening consumption. The Commissioners now suggest no less than 23 new tramway routes, to carry out their views of rapid transit, to scatter the working-class population, and so to relieve congestion. This, of course, would tend to a more sanitary condition. But coincidently it would also contribute to the extension of that revolution of London life—the night depopulation of large areas—which had its source in the City; and it might also be expected that the change in the hours of greatest gas consumption in the districts affected would continue. A balance in the gas demands of those districts would, however, no doubt be struck by the greater employment of gas for business and industrial purposes during the daytime, to meet the needs and operations of the great and growing host of workers, from that ever-extending population which (the prediction is) will reach 11 millions by 1931. Such consideration shows how, under the change of conditions pictured in this report, all the Suburban Gas Companies would largely benefit. Looking at their present substantial annual increases, may it not be asked whether the change has not already begun?

To the mistakes of the past are attributed the traffic difficulties of the present; and their rectification can only be accomplished by drastic and colossal methods. The means for the transport of the masses are only one of the remedies; others have been alluded to in previous references to the work of the Commission. But further light is thrown upon their suggestions, in regard to one of which they do not appear to entertain the liveliest hopes of execution. This part of their scheme has reference to the cutting of magnificent main avenues through London, and the opening up of other arterial thoroughfares of less magnitude. The dream embraces avenues 140 feet wide and arterial streets 100 feet, 80 feet, 60 feet, and 40 or 50 feet wide. Here, again, the Gas Companies will be affected; for in these streets subways are projected for gas and water pipes, cables, and, in fact, the whole of the heterogeneous occupants of the subsoil. The

cost of this heroic scheme is calculated at about 24 millions. Subways, so far as gas and water pipes are concerned, have been shown in previous allusions to the subject to be unnecessary, as in Central London, where traffic is heaviest, the distribution systems are established, and rarely require attention, unless through extraneous causes, such as the construction of tramways and underground railway works. But, of course, should such a main street scheme be developed (which is not probable), the Gas Companies would have to fall into line with the other users of subterranean London. In the general utility of what the Commissioners propose, there can only be acquiescence; but they give some inkling of their own doubt as to the financial feasibility of the scheme. Practical men will have little hesitation in summarily dismissing the project as visionary; and the Gas Companies need have little concern at present over any such vast disturbance of their carrying and distributory systems as this grandiose scheme envelops. The errors of the past in the planning of London illustrate the impenetrability of the future by the human eye; and the inquiry that has just been completed by the Traffic Commission shows how great may be the expense involved in any adequate correction of those errors.

A more practical proposal is the appointment of a competent and permanent Board, independent of existing governing authorities other than Parliament, to which Board would be referred all questions of road and traffic improvement or development in the contemplated Greater London, and all questions relating to the use of the subsoil of the roads. For the time being, their duties would be consultative and advisory, in order to systematize improvement, development, and use. It is suggested that to Parliament the Board should periodically report upon locomotion, transport, and traffic in Greater London, and should make a preliminary examination of Bills in which statutory powers are sought affecting roadways and traffic. Of course, the London County Council, taking a noble view of their own self-sufficiency in these matters, are opposed to their tramway operations coming under the scrutiny or jurisdiction of such a Board. But the views of the London County Council will have to be subordinate to the commonweal. The Gas and Water Authorities would, of course, prefer to be subject to the control of a body of competent men in such matters as would come under the supervision of the Board than have to submit themselves to other bodies whose constitution and qualification might be opposed to the proper grasping of essentials affecting purely engineering operations and supply conditions. Such a supervisory Board would lighten enormously the labours of Parliamentary Committees. Before the late Government went out of office, there were expectations of legislation which would have brought into existence such a Board; but the problem of London's future has not yet attracted the notice of the present Government, who do not appear to have a clearly defined, independent existence from the London County Council. Whatever happens, the Gas Companies of London and of the suburbs have been equal to all changes of condition in the past, and they will not be less so in the time to come.

Vertical Retorts and Other Subjects at the German Association Meeting.

The forty-sixth annual general meeting of German Gas and Water Engineers, which closed last week, proved fully equal to the high standard of excellence to which we are now accustomed in connection with these mammoth gatherings. The attendance was little short of the maximum recorded in past years; the cosmopolitan nature of the assembly was as pronounced as usual; the festivities and social functions were perhaps even on a grander scale than previously; and, lastly, the technical proceedings were, as a whole, of a high order of merit and utility.

To gas men, the chief interest will centre in the paper by the designer of the Dessau vertical retort—Dr. J. Bueb—in which he reports the results of a series of scientific investigations on the carbonization of a Westphalian and an English (New Leverson) coal in this retort. These results will be valuable to the many gas engineers who are now engaged in studying modifications of existing systems of carbonizing coal, with a view to the adoption of new methods better adapted to the changed conditions of gas supply in respect of quality of the gas. We question, however, whether they will be very generally regarded as favourable to the Dessau type of vertical retort. If the increased make reported of the latter is attained only, as Dr. Bueb has suggested, through maintaining coke at a carbonizing temperature for four to six hours, the consumption of fuel must inherently be higher per 1000 cubic feet of gas made than in a process in which coke is got out of the retort as soon as it is made. It is economically indefensible to continue to heat an admittedly relatively unproductive material for many hours at a carbonizing temperature; and it looks as though economy of carbonizing fuel is, with the Dessau retort, being sacrificed to the fetish of high makes. It also appears from Dr. Bueb's investigations that the Dessau vertical retort attains its high yield of ammonia, in some degree at least, at the expense of the cyanogen in the gas. On the whole, we doubt whether the results published will convince most gas engineers of the superiority of the Dessau system of carbonization in a vertical retort to contemporaneous competitive systems, though they are very acceptable on account of the light that they throw upon the process.

For the rest, as will be seen from the reports published in the "Journal" last week and to-day, the Bremen meeting witnessed the publication of the results of researches conducted at the Reichsanstalt on the relative values of the Hefner, Harcourt, and Carcel standards of light, and their susceptibility to changes in the meteorological conditions. These results will greatly help in placing photometrical observations on a common basis the world over, even though an international agreement as to a universal standard of light be deferred indefinitely. There were also communications on stoking machinery and conveying plant; but they were not of exceptional interest. The good work always done by the various Technical Committees which the German Association appoints and finances is again conspicuous—perhaps more particularly this year, in regard to the difficult problems involved in the electrolysis of mains by vagrant electric tramway currents. But many other matters of importance have also been profitably handled by these Committees, which repay a thousandfold, to the gas industry at large, the moderate expenditure incurred upon them by the German Association. In this direction, at least, our English Institution might advantageously take a leaf out of the working programme of its German congener.

The British Engineer and Modern Science.

Is the British engineer in general, and the gas engineer in particular, as fully alive as he should be now-a-days to the value of purely theoretical work and abstract scientific thought? Is there not a danger of his falling back in the race of competitive progress, unless he fully realizes the need of an advance guard, as it were, of theorizing engineers and physicists, to point the way to practical engineers and commercial men? Some such queries as these are suggested by the discourse that the Right Hon. R. B. Haldane, M.P., delivered on the occasion of the opening of the new building for electric and photometric work in connection with the National Physical Laboratory, an account of which was given in the "Journal" last week. The Secretary of State for War (than whom probably no other member of the present Government is so competent to speak upon such a subject), comparing our own attitude towards science with that adopted by other countries, pointed out that we always put material prosperity first, and then, having achieved this, seek after the scientific cause of it and possible developments from it. Other countries, he said, began with the scientific side—as, for example, when Prussia was recovering from Napoleon's invasion, she began her emancipation by founding a University. Our attitude was the outcome of the Anglo-Saxon character. We quoted his words when dealing last week with the position of the vertical retort. The British character, and essentially that of the British engineer, is pre-eminently one which leans to the concrete, and not to the abstract, side of questions. The British gas engineer is above all things, and properly prides himself on being, a practical man. The very nature of his work, with its every-day problems, leads to this result of practicality, apart from the historical development of the industry, which induces to the same end. Murdoch was no theorizer, but a practical working engineer. All this being so, is there not a tendency on the part of the work-a-day gas engineer not to appreciate at their true value, and in their exact proportion, the contributions made to his industry by the man of

science, the mathematical engineer, and the experimenting chemist? We hardly think the gas engineer does altogether rightly and fully appreciate the work of these his real *confrères* and collaborators. But none the less we also believe that a better mutual understanding between the exponents of theory and practice is rapidly coming about; and one result of this, apart from other operating causes, is the increased interest that the English engineer takes in the doings and technical papers of his Continental colleague. For, to quote Mr. Haldane again, we are, "a broad-minded world, "this world of the Twentieth Century," and we realize that the bond of science affords a great intellectual common ground for men of all races who are working at a common task—the progress of mankind. We still hear a great deal concerning the "future of the gas profession," as to which we are very far from being pessimistic; and we believe that one step in the upward direction will be assured by the recognition, cultivation, and appreciation of the more theoretical and less practical workers in our industry, and in the many branches of science to which it is so closely allied.

Oil-Gas Tar For Road Surfaces.

The remarks made by Sir George Livesey, at the recent meeting of the Institution of Gas Engineers, on the utilization of tar for improving road surfaces, have revived interest in a subject which has been referred to from time to time in the "JOURNAL." The use of tar on roads is, of course, by no means new. In France, it was tried as far back as 1880, with encouraging results; but it was taken up seriously four or five years ago by M. Le Gavrian, the Engineer of the Ponts et Chaussées, in the department of the Seine-et-Oise, and by others, the results of whose labours were presented to the members of the Société Technique du Gaz by MM. Mallet and Payet in a paper submitted at the congress in Paris two years ago. In our columns about a year ago there appeared an article giving the results obtained by Mr. J. George-Powell, the Engineer and Surveyor to the Godstone District Council, by the use of tar macadam for road making. A fortnight ago, we reproduced from the "Automobile Club Journal" an article showing how the main road through Dunstable has been treated with tar by the Borough Engineer; and in another column will be found an account of some practical tests of the value of the tar resulting from the manufacture of water gas, carried out by Mr. W. H. Maxwell, the Borough and Water-Works Engineer of Tunbridge Wells, on about 10,000 square yards of main roadway surfaces carrying a considerable quantity of fast motor and traction-engine traffic. These are all interesting contributions to the literature of a subject which is growing in importance in consequence of the changes which have taken place in our methods of locomotion.

Bolstering-Up Municipal Electricity Works.

The Exeter City Council proved last week to be unamenable to reason on the public lighting question. Of the two schemes submitted for their consideration, there can be no question as to that of the Gas Company being the more advantageous. It offered at least as good lighting at much less cost than electricity. If the Council had been free to choose between the two estimates, there can be little doubt that they would have accepted the lower one; for, apart from the anxiety of the members to bolster-up the municipal electricity works, there is no reason why the Council should desire to unnecessarily add 1d. in the pound to the heavy burden of the local rates. But the councillors were not free to choose. As the Chairman of the Electric Light Committee put it, the matter was not to be decided on the bare question of cost. What they had to consider was whether they could help the electricity undertaking. Alderman Reed, it is true, tried to gild the pill by holding out the hope that if the citizens paid £200 or £250 a year more than was necessary for lighting, they would get it back in profit on the electricity works. But Mr. Perry, another supporter of municipal trading, carried the contention a good deal farther. From his speech it would appear that the amount to be paid for lighting is of no consequence, so long as it is paid to the Electricity Department. The Corporation have built large works, and have plant capable of producing much more electricity than private users require; and whether the amount to be paid for electric lighting is £400 or £200 more than for gas, it is to the interest of the city that they should support their own undertaking by paying the larger sum. If the ratepayers of Exeter are content with this arrangement, there is no more to be said. They ought, however, to understand that every penny which their public lighting costs in excess of the sum for which the Gas Company are prepared to do it, is a direct subsidy to the municipal electricity works, and that, instead of the undertaking putting money in their pockets, it in this way becomes a drain upon their resources. Some attempts were made to show that incandescent gas lighting is less satisfactory than electric lighting, because mantles do not, after a certain number of hours, give the same duty as at first. Those who put forward this argument were, however, unanimous in rejecting a proposal that there should be a public demonstration of the two kinds of lighting, in such a position that the citizens might judge for themselves whether the electric light is really worth the extra sum they are to pay for it. Although this suggestion was not accepted, it is contended by a local newspaper (which thinks the City Council arrived at a right decision) that their action will give the citizens an opportunity of comparing on a large scale, and over a period of five years, the lighting by the two methods, as electricity will be installed in certain thoroughfares and improved gas lighting in others. In making the comparison under these conditions, the citizens will have the satisfaction of knowing that they are paying handsomely for it.

Results at Oldham,

Though the results of the working of municipal gas undertakings which are noticed this week are of the same satisfactory character as those already dealt with, each one of them contains points of interest. Some of the more striking of these it may not be amiss to briefly indicate here. The net surplus at the disposal of the Oldham Gas Committee, after deducting the amount (£6991) to which the Corporation are by Act of Parliament entitled in aid of the borough fund, is close upon £14,000; and in view of this large balance, the Committee proposed a reduced scale of charges (graduated according to consumption) for large users of gas. This, however, did not meet with the approval of the Council, who referred the recommendation back to permit of the claims of the smaller gas consumers to a reduction being more favourably considered. On behalf of the Committee, it was stated that "they found the largest consumers were the real profit-producers;" and this being their view, the desire to retain their custom by concessions in the matter of price is quite understandable. With regard to the past year's working, the total quantity of gas manufactured shows a gratifying increase of just over 5½ per cent.; while the average quantity of coal gas made per ton of coal and cannel carbonized was 11,010 cubic feet, as compared with 10,614 cubic feet in the previous year. At the same time matters were still further improved by a reduction in the unaccounted-for gas from 7·02 to 5·82 per cent. The gross revenue of the undertaking last year amounted to practically £170,000; and yet we see a member of the Town Council characterizing the expenditure of £8 4s. 6d. on the attendance of their Engineer at the Gas Institution meeting as a "scandalous waste of the ratepayers' money." Surely the sense of proportion is sadly lacking here; for, be it noted, the objection was not one of principle, but merely of amount. However, so long as there are municipal councils, there will doubtless be members whose anxiety for the ratepayers' pockets will induce them to overlook the fact that there may be advantages which will outweigh the expenditure of a few pounds.

And at Longton and Hereford.

There was a slight falling off in the sales of gas at Longton last year, but the report is nevertheless an excellent one. The capital per 1000 cubic feet of gas sold (which at one period, owing to the large sums taken in relief of the rates, was uncomfortably high) has of late years been gradually reduced; while at the same time substantial amounts have been contributed to the rates, and financial help has been rendered to the electricity undertaking. For the past year, £2500 has gone in aid of the rates. This is equal to 4½d. per 1000 cubic feet sold; and to it has to be added 11½d. for interest and sinking fund charges. The undertaking is therefore called upon to pay 1s. 4d. per 1000 cubic feet for these purposes—which must of necessity have an influence on the price

of gas. This is now 3s. 1d. (less 5 per cent.) for lighting, and from 2s. 4½d. to 1s. 10½d. for motive power purposes. There has been a gradual improvement in the working results, until, as will be seen, the present report shows a make of 12,100 cubic feet per ton of coal carbonized, and a sale of 11,166 feet. Although the town is considerably undermined by collieries, the unaccounted-or gas stands at only about 6½ per cent. Hereford, also, has experienced a trifling falling off in consumption; but this is far more than accounted for by the adoption of incandescent burners for the railways, and the installation of electricity at a hospital and the post office. An almost imperceptible drop of this kind can be regarded with a very considerable degree of equanimity, when it is remembered that during the seven years that an electric light undertaking has been in operation in the city, the quantity of gas sold and accounted for has increased no less than 26·91 per cent. There was a considerable saving of coal last year, in consequence of an improved yield of gas being secured. The average make per ton carbonized was 10,909 cubic feet, or an increase of 314 feet; while the average amount sold and accounted for was 9974 cubic feet.

The Hereford Gas Managership.

Mr. Parlby's report on the past year's working at Hereford brings to mind once more the circumstances under which he has been compelled to resign his position as Gas Engineer to the Corporation after a length of service which falls not very far short of a quarter-of-a-century. From the references which have appeared in the "JOURNAL" from time to time, readers will have gathered that a great stir has been caused by the matter in the city. It has been recorded that several petitions have—it is to be regretted, without effect—been forwarded to the Town Council, asking them to permit Mr. Parlby to withdraw his resignation; but in addition to this, the local papers have for weeks past published numerous letters dealing with the subject. These we have, of course, been unable to notice in our columns; but it may be remarked that many of the correspondents champion Mr. Parlby's cause in an able manner. In face of all the facts, it is impossible to deny that there is a large body of public opinion in Hereford which is very strongly in favour of Mr. Parlby; and though all efforts to move the Council in their determination to have a change of management have proved unavailing, this reflection no doubt affords considerable consolation to Mr. Parlby in his troubles. But in addition to those in the city, he has (as was shown, for example, by the resolution passed some time ago by the Midland Association of Gas Managers) a large number of friends among those connected with the gas industry; and they will have read with pleasure, in last Tuesday's issue of the "JOURNAL," the testimonial presented to him by the Gas Committee at the time when the resignation was first decided upon. This document, it may be pointed out, was reproduced from the "Hereford Times," with whose opinion upon it we are in most cordial agreement—namely, that "no public servant could possibly be honoured with a more unqualified and glowing testimonial to his ability, zeal, and faithfulness than that which Mr. Parlby has received from the accredited Committee of the municipal body which has dismissed him." As is recorded in another column to-day, his successor has already been appointed; and in a few short weeks Mr. Parlby will be called upon to take leave of the city in whose work he has spent many of the best years of his life. Though the knowledge of his great services has been unable to prevent this parting, the record of them which has been set down by the Gas Committee should certainly prove of substantial assistance in connection with his future work for the industry. At any rate, the hope that this may be the case is shared by the "JOURNAL" with his many friends and well-wishers.

Liability for Explosions in Telephone Boxes.

The result of the appeal in the case of *Ogden and Smith v. The Gaslight and Coke Company* which is reported in our "Legal Intelligence" to-day, is undeniably of serious import to gas undertakings. In the best of regulated gas distribution systems, a small percentage of leakage is inevitable; and with the growing number of telephone and electric-light boxes in our towns and cities, the opportunity for accumulation, unless the boxes are made gas-tight, or are ventilated, is daily increasing. Under the circumstances, it is inequitable that, in the event of an explosion, and personal or other injury being occasioned (more particularly in the circumstances disclosed in this case), liability should rest upon the gas distributors, unless wilful negligence on their part can be proved. In this case, a lady and gentleman were injured in October, 1903, through explosions in telephone manholes. It, of course, rests on gas suppliers to use all reasonable and possible care to prevent leakages; and, in the Lower Court, the jury held that the Gaslight and Coke Company had been negligent in this instance. It appears that in the month of July preceding the occurrence, the Post Office telephone officials were aware that gas was finding its way into the telephone boxes; and they communicated with the Gas Company. The Company, the evidence in the Lower Court demonstrated, made all reasonable investigations, but failed to trace the source of leakage. At the time of the explosions, a Post Office jointer was working at one of the manholes, and used a blow-lamp, which the Company contended—it seems to us very properly—was the "effective cause" of the explosion. The evidence was conclusive (their own communication to the Gas Company the preceding July showed it) that the Post Office authorities were cognizant of the accumulation of gas in these manholes; and it appears to us that, having that knowledge, the Post Office officials were guilty of negligence in not having the boxes ventilated before using a light at one of the manholes. As a matter of fact, the Lord Chancellor said he thought "the combined negligence of both the Company and the servant of the Post Office caused the accident; but," he added, "unquestionably the defendants' negligence in allowing the gas to be there, was, if the phrase must be used, the 'effective cause.'" We might just as properly contend that the provision by the Post Office of receptacles for the accumulation of gas was the "effective cause." The appeal was dismissed with costs; the Master of the Rolls and Lord Justice Cozens-Hardy concurring. There was no question as to damages; the parties having agreed upon the amount, in the event of the Company being held liable. The decision imposes upon gas suppliers not only responsibility for their own acts, but for the acts of people who are not their servants. This is a serious matter.

The Economical Capacity of Lowe Water-Gas Plant.

In another column will be found the text of a paper read by Mr. Rollin Norris, the Superintendent of Works for the United Gas Improvement Company, of Philadelphia (Pa.), at the recent annual meeting of the Western (U.S.A.) Gas Association, on the "Capacity of Water-Gas Sets." The author, at the outset, acknowledged that high capacity in a plant of this kind is a virtue, when it can be obtained without a corresponding sacrifice of other efficiencies; but he pointed out that emergency conditions may frequently arise when, even at the sacrifice of efficiency, it is desirable to be able to "run up" temporarily the capacity of a set. Mr. Norris showed how, by enlarging the connections between the shells, and increasing the diameter of the stack-valve from 8 inches to 18 inches, he obtained, with no increase of pressure under the grate, more than twice the quantity of gas. One of the conditions of high capacity may therefore, he thinks, be summed up in the expression "more wind;" but he epitomized them as follows: Rapid passage of the air through the generator during the blow, and avoidance of excessively high temperature at the end of it; high temperature of the fire at the end, and a sufficient supply of steam during the run; a good clean fire, offering as little resistance as possible to the passage of the blast; and proper mechanical arrangements for making the valve changes and cleaning the fires with a minimum loss of time. The conclusion he arrives at is that the maximum capacity of a Lowe water-gas set is obtainable when making gas of comparatively low candle power, as, under such circumstances, the plant can be worked more nearly up to the capacity of the generators; and he considers that the net economical capacity of a water-gas apparatus of standard construction is approximately 10 per cent. less than its maximum capacity.

At the second *conversazione* of the Royal Society, Sir James Dewar showed a new charcoal calorimeter and thermoscope. Charcoal at the temperature of liquid hydrogen that has absorbed at atmospheric pressure considerable quantities of helium or hydrogen—or alternatively of nitrogen, oxygen, or air at their respective boiling-points—is utilized as a material that, by reason of changes in the volume of the occluded gas, exhibits great sensibility to heat and light radiation, and can be used in calorimetry at the temperature of solid hydrogen.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 127.)

ALL last week the Stock Exchange continued in the same unsatisfactory condition as before; being quite unable to throw off the nervous sensitiveness that made markets a prey to sudden and irregular changes which were frequently difficult to account for. The opening was weak; and things tended downward. Then came a halt; and prices made a brave show of advancing. But there was no real backbone in the movement, and they soon gave way again. Oscillations succeeded until Friday, when the weakness became strongly pronounced (chiefly under apprehension of Egyptian trouble being superadded to our already full measure of African difficulties); and selling was the order of the day. Things were not quite so bad at the close, but not good enough to redeem an uncomfortable week. Consols were more than once as low as 87⅞. The Money Market was extremely easy, the supply being overabundant beyond all requirements; and short loans were done at remarkably easy rates. Discount terms, too, were relaxed. In the Gas Market, business was fairly good, and was better distributed through the list than is often the case; some issues which had been lying dormant awhile now coming into action and taking a share in the operations. Although changes in quotation were few, and one or two of these were in the downward direction, the tendency was firm and steady; the adverse movements having no general bearing. In Gaslight and Coke issues, the ordinary was well up to the average in point of activity, and was firm. Transactions ranged in price from 97¾ to 98¾ (with a rise of a half in the quotation). The secured issues were very moderately dealt in. The maximum changed hands at 89; the preference at 109½ and 109¾; and the debenture at 87 and 87¼. South Metropolitan started very briskly, but relapsed into inactivity later on. Except for one small amount done free, prices were very firm and close—not wandering outside the limits of 129½ and 130—and the quotation might well have been advanced a point. The debenture marked 88½. A little was done in Commercials; the 4 per cent. changing hands once at 114¾; and the 3½ per cent. at 110½ and 111. The Suburban and Provincial group were not active; but they did furnish a little better contribution than usual to the operations of the week. Alliance was done at 20 and 20¾ (a fall of one point), Brentford old at 266, ditto new at from 201¾ to 203½, ditto debenture at 103 and 105, and British at 42¾. On the local Exchange, Newcastle advanced a point. In the Continental Companies, Imperial resumed activity, and changed hands at steady figures ranging from 177 to 178½. Union also was more active; the ordinary marking 125, and the preference 143 and 144. In European, there was one bargain in the fully-paid at 24½. Malta advanced fractionally. In the undertakings of the remoter world, Buenos Ayres marked from 11¾ to 12⅛ (a fall of ¼ in the quotation), ditto debenture 97 and 97½, Primitiva ordinary from 6¼ to 6½, ditto debenture 96½, River Plate 12½ and 12 1/16, ditto debenture from 96 to 96½, San Paulo 13⅞, Cape Town 16, Oriental 149½, and Melbourne 4½ per cent. 103.

The closing prices are shown in our Stock and Share List on page 127.

ELECTRIC LIGHTING MEMORANDA.

Electrical Power Supply in London—Private Enterprise or Municipal Administration Considered—Sir William Preece and the Superiority of Gas for Outdoor Purposes—Tests of the Tantalum Lamp.

DURING the present session of Parliament, the inquiry by the Hybrid Committee into the question of the electricity bulk and power supply of London has been followed in our "Notes from Westminster;" and the decision and report of the Committee were noticed last week. Considering the decision and report in conjunction with the fact that Committees of both Houses of Parliament pronounced favourably on the scheme of the Administrative County of London Company last year, it may be taken that Parliament are agreed, rightly or wrongly, that London industries urgently want a special supply of electricity for power purposes, and that the existing electricity distributors are unequal to the task of providing it cheaply. Therefore, an electric power undertaking for London is one of those things that, so far as it is humanly possible to speak with definiteness, is bound to come. But there is complaint in the Daily Press that the dallying with the subject by Parliament is seriously delaying the time when the blessings of electricity for power purposes will be available for manufacturers. From the manufacturers themselves, we have not seen any such complaint, nor manifestly do they contemplate delay with any amount of fear. However, as it must be accepted—without admitting the necessity—that a gigantic undertaking of the kind there will be, the question arises as to whether the fullest development of the business of such an undertaking can be best secured by private enterprise or by municipal management. An article in the Engineering Supplement of "The Times," and one in the July number of "The World's Work" together furnish several suggestions for consideration; and having regard to the suggestions, the conclusion cannot be avoided, except maybe by those who are prejudiced to an abnormal degree, that in the interests of all—manufacturers, railway companies, and, last but not least, ratepayers—it would be better for the supply, which must be purely speculative, to be in the hands of a statutorily regulated Company. The attempt at mixing up municipal affairs with vast manufacturing interests will, it is held by "The Times," lead to complications; and these, in our own opinion, will lead to resentment on the part of the manufacturers, and militate against the success of any scheme so governed. The rejection of what the Board of Trade and the Hybrid Committee regard as the malformation that the County Council presented this session as an adequate scheme for London, ought to convince Parliament of the incompetence of the Council to administer such a concern, and their inability to appreciate from an engineering and economic point of view the magnitude of the problem, apart altogether from the question of the risk involved.

Concerning this risk, power supply by electricity cannot, with competitors abounding, be regarded as a monopoly, any more than gas supply can be so described in these changeable and inventive times. The present electricity undertakings will put forth strenuous efforts to save as much of the power business as possible; gas undertakings will not be less alert; and the suction gas people will struggle to improve on their present gains. As is truly said in the article in "The World's Work," with factories it will not be merely a question of low price that will be necessary to secure their power business. To facilitate the scrapping of present machinery, there will have to be hiring out of the requisite new machinery, with option of purchase; and guarantees will be demanded, and will have to be conceded. A manufacturer will expect to be treated in his dealings for power supply as he is called upon to treat others in the ordinary course of his trading. Hundreds of thousands of pounds will therefore be involved in making the use of electricity attractive, and the business "go." No pusillanimous methods will suffice. "These are big matters of policy" which cannot be dealt with by any municipal administration so well as by a company whose financial success is dependent solely upon their organization and energy in pushing business. On the whole, perhaps it would be better for the Gas Companies to have as a competitor in this matter the London County Council than a private concern whose administration would concentrate their efforts on realizing success. The field for business is believed to be an immense one; but estimates based on what must, to a large extent, be purely conjecture have a way of presenting a very distorted appearance when we come into contact with the actual facts. It is calculated that, apart from heating, lighting, and County Council tramways, the requirements of London for electric power and traction is 1800 million units per annum. All that can be said of this figure is that it is interesting but supposititious. But it matters little what is said now upon the general question. It has descended into the arena of party politics; and, as things are at present, a scheme will ultimately emerge in the custody of the County Council, for them to trifle with to the ratepayers' disadvantage. Millions will be involved in the bold, comprehensive scheme that is advocated by the Board of Trade and the Hybrid Committee. Cheap electrical power supply may, as the primary result, be obtained by manufacturers; but if the ratepayers generally suffer as a secondary result, then we shall be among those who will fail to see the benefit to London from the economical point of view.

The Daily Press has been giving circulation to a little sound advice that Sir William H. Preece has been imparting to the Carnarvon Harbour Trust; and it is said that his advice created considerable sensation among the members of that body. It did nothing of the kind, because the members generally were in complete agreement with Sir William. The Works Committee made the proposal that incandescent gas-burners should be substituted for ordinary gas-burners for outdoor lighting, when the Chairman (Mr. John Menzies) ventured to inquire, "Why not adopt electric lighting?" It was left to Sir William Preece to answer that there is "no question whatever that for outdoor lighting, incandescent gas-lamps are better than electric lighting; the reason being that the light is far better distributed than by electric glow lamps." He added that he "has had occasion to advise many public authorities to this effect." Upon this the Chairman remarked, "then that is quite sufficient for me." That is not the same story as is told in a sensational paragraph published by the "Daily News;" but it is not any the less satisfactory from our point of view, as it shows that—notwithstanding the blatant talk of electricians over the development of electric lighting—Sir William in this matter is not chameleon-like, nor does he find that anything has happened to cause him to alter his opinion of more than a decade ago. We remember that, in his British Association paper of 1896, on incandescent lamps, the best result he gave for electric lamps was far above the cost of gas lighting. Professor Ayrton pointed this out in the discussion; and Sir (then Mr.) William Preece's reply was, "Gas per hour is unquestionably cheaper than electric light." Then came the famous Maidstone report—that, of course, is some years ago now, and not just lately as some people seem to imagine—in which Sir William advised the Corporation, as he now says he has advised many others, that incandescent gas lighting is better than electricity for the streets. Subsequent to this, when Sir William was Chairman of the Council of the Society of Arts—this was in the year 1901—in his address, he again said: "The use of arc lamps for street illumination, in the United Kingdom, is not to be compared with the practice in the United States; but the difference is due to the

universal presence of cheap gas here, and of no gas or dear gas there. As a matter of fact, gas used with the Auer mantle can compete satisfactorily with electricity in this direction." These quotations do not lend support to the suggestion of the "Electrical Review" that Sir William was perhaps playing the part of a practical joker at Carnarvon; but they do show that when Sir William's severance from professional work comes, he will be able to say, "At least in this one thing of street lighting I have been consistent." It seems to be beyond the grasp of the electrical Chauvinist, that, as a consulting engineer, it is Sir William's duty to honestly advise what he regards as the best and most economical system of street lighting; but in doing this, he is in no way disqualifying himself from advising, when asked to do so, as to the best system of electric lighting for street purposes.

It is upon the metallic filament lamps that electricians are depending for effectual competitors with the ordinary incandescent gas-lamps. We hear of reductions in price being made to popularize them; and therefore all information that can be collected concerning them may be useful. An article on tantalum lamps, by Mr. Percy Good, lately published in the "Electrical Review," ostensibly for the purpose of showing the efficiency of these lamps, really exhibits their variability and unreliability, as well as, admittedly, the advance made in respect of the wattage per candle power when the lamps behave themselves. Mr. Good did not seem to be aware, when purchasing three of these lamps for his tests, that they are no good on an alternating-current system. But he was informed of what has for months been a well-known fact; and then he decided to burn [*sic*] them on a direct-current circuit, and measure the candle power at intervals. The lamps were supplied for a 110-volt circuit; and the average pressure during the test was 109 volts, and the maximum 110 volts. The measurements were made at exactly 110 volts, so that this condition was fulfilled. The tests of the three lamps were conducted over a period of 800 hours. During the first 100 hours No. 2 lamp blackened very considerably; and the other lamps had blackened "somewhat" by the end of the test. We will first of all take the best two lamps (Nos. 1 and 3). The mean horizontal illuminating power of No. 1 lamp was 24 candles during the first 100 hours; and the watts per candle, 1·6. This was the best result obtained. So that for a unit of electricity, if the highest candle power and lowest consumption per candle could be maintained, the lamp would give 24 candles for 26 hours for a unity of electricity. But with an ordinary incandescent gas-burner, an illuminating power of double that given by this lamp could be obtained for a greater number of hours by the consumption of 100 cubic feet of gas; and with a bijou inverted gas-burner the same illuminating power, 24 candles, could be obtained for 100 hours by the consumption in that period of 100 cubic feet of gas. In the 300 hours, the mean horizontal illuminating power had dropped to 23·4; in 500 hours, to 21·2; the consumption per candle then being 1·8 watts per candle; and between the 500 and 800 hours, the mean illuminating power was 17·5 candles; and the consumption 2·2 watts per candle. This was the best lamp of the three; and the tests were made under laboratory conditions. No. 3 lamp was the next best. In the first 100 hours, the mean horizontal power was 20·5 candles; and the consumption 2·1 watts per candle. In the 300 hours, the mean illuminating power was 20 candles, and the consumption 2·2 watts per candle. With the same consumption, in the 500 hours, the mean horizontal illuminating power had fallen to 19·1 candles; and between 500 hours and 800 hours, it was 17·8 candles, and the consumption 2·3 watts per candle. The lamp that blackened considerably during the first 100 hours (No. 2), gave a very bad account of itself. It started with a mean horizontal illuminating power of 21·2 candles, and a consumption of 1·9 watts per candle; the mean of the first 100 hours being 12·5 candles, and the consumption 3 watts per candle. In the 300 hours, it declined to 9·5 candles, with a consumption of 4·1 watts per candle. Then by 500 hours, the mean illuminating power registered was 8·1 candles; and the consumption 4·6 watts per candle. Between 500 and 800 hours, 7 candles were recorded as the mean, with a consumption of 5 watts per candle. These tests establish the variability and unreliability of these lamps.

Composition of Coal Tars.—In a recent contribution to the "Berichte," Herr E. Börnstein deals with this subject. In a previous communication, reference was made to the presence of catechol in tar liquors obtained by decomposing German coals at the lowest possible temperature. In the course of the same investigation, tars were obtained differing considerably from ordinary gas tar, and resembling the Jameson coke-oven tars. One specimen, however, obtained from Westphalian coal of the Altendorf pit, behaved differently. When distilled at 500° C., this coal furnished a tar which was free from paraffin and naphthalene, and had a specific gravity of 1·03. The fraction distilling above 350° C. gave an oil which on cooling deposited fine greenish-yellow crystals, consisting of a mixture of methylanthracene, ($C_{15}H_{12}$) and "crackene" ($C_{24}H_{18}$). A similar fraction was obtained from tars produced by decomposing Westphalian coal from two adjacent pits; and it would therefore appear that these types of coal, which yield a high percentage of coke, furnish tars poor in hydrogen, containing no solid paraffins, but yielding solid aromatic hydrocarbons of high boiling-point.

NOTES FROM WESTMINSTER.

THERE is to be an autumn session; but it is not expected that any part of it will be devoted to private business. For the recess, Parliament will rise early in August; and Private Bills are now being hurried forward, to get them out of hand as quickly as possible. The House of Lords have always pretty good cause for an annual complaint over the manner in which Bills are thrust upon them by the Commons, just as their Lordships' thoughts are turning lightly to retreat to their ancestral homes or country seats away from London's heat and crowd, or to travel elsewhere in search of rest and recreation from the turmoil, which has been aggravated of late, of their legislative life. In the past week, Lords' Committees have been sitting in the almost intolerable heat of the Committee Rooms—which have been fairly well crowded, owing to the public importance of the measures—considering groups of Bills that have to be dealt with before the recess, and dispatching them for further progress. Among the contested Bills in the Lords, there have only been two in which we have found very much interest—the Pontefract Corporation Bill, which proposes the compulsory purchase of the Gas Company's works, and the London County Council (General Powers) Bill, in which are clauses having for their purpose the giving, to the Borough Councils of London, of wiring and other powers which are supposed to facilitate the development of business, but which are objectionable from the ratepayers' point of view. As a matter of fact, experience in their use elsewhere has been that the beneficent effect has not accrued that those anticipated who have had the powers conferred upon them; and, in short, this mode of developing business has been found too expensive. Two or three Bills have also had consideration in the Commons Committee Rooms which claim a little reference; the Wolstanton Gas Bill being the principal. Unopposed measures were before the Lord Chairman on Tuesday, and produced several matters calling for notice. The Derby Gas Company's Bill was one of them; but report on the Bill has been deferred in order to allow of amendments being incorporated to carry out certain agreements regarding the limits of supply. There was some elucidating conversation, too, over the Cheltenham Gas Company's Bill, in connection with the freedom that the Gas Examiner will have in connection with the testing of the gas supply for pressure. Under the clause now standing in the Bill, the Examiner can, without notice to the Company, take his tests at the top of any lamp-post, at a level with the burner; and there is to be a deduction of $\frac{1}{10}$ inch to allow of the difference of pressure at the top and the bottom of the column. The clause prescribes exactly how the tests are to be made; but it is clear that the Company will have to place generous and implicit reliance upon the integrity of the Examiner in following out his statutory instructions. The testing clauses were the features of the Peterborough and South Suburban Bills (noticed below) which were also before the Lord Chairman. One matter to which reference was made in last week's "Notes" can be disposed of here. The South Lincolnshire Water Bill came before Mr. Toulmin's Committee as arranged, so as to enable the objections of the Local Government Board to the measure to be discussed. The result was that the Committee were favourable to the arrangement made between the Spalding Council and the South Lincolnshire Water Company. Certain amendments, however, were ordered. Among other things, little parishes were given protection, which will prevent the Company unreasonably withholding from them a supply of water. Confirmation was also given to the purchase by the promoters of the Bourne Water Company's undertaking. The Glamorgan and South Wales Water Bill and the Cumberland Electricity and Power Gas Bill are proceeding uncontested through the Commons. Allusion was made to them (when in the other House) in the "JOURNAL" for May 15.

Testing Clauses. As has been previously said, though in the main it is apparently the intention of Parliament, as opportunity allows, to get the testing of the illuminating power of gas on a more uniform basis than hitherto, by the application of the model clauses (see the revised version in the "JOURNAL" for May 22, p. 521), the authorities at Westminster are not stubborn on matters of detail. We see this in the Bills that have been before the Lord Chairman in the past week. In the Cheltenham Bill, the open bar photometer is prescribed; the arrangement that will be used being that described and illustrated in the "JOURNAL" for June 26 (p. 920); in the South Suburban Bill, the open-bar is also cited; and in the Peterborough Gas Company's Bill, the table photometer is specified. But in all cases Carpenter's "Metropolitan" No. 2 argand gas-burner, Harcourt's 10-candle standard pentane lamp, and the 5 cubic feet rate of consumption, are provided for. We are able to give in our "Parliamentary Intelligence" this week the exact wording of the testing clause from the South Suburban Bill, the general tenor of which was pointed out by Sir George Livesey in a letter published on May 29 (p. 587). The precedent created by this clause is an extremely valuable one for gas companies outside London, as it gives the Company a latitude of ½ candle below 14 candles before they are subjected to penalty; and for a deficiency exceeding ½ but not beyond 1 candle, the penalty is not to exceed £5. In the Peterborough case, the Company are not to be liable to a penalty unless the average of

three consecutive tests made in any one day, at an interval of not less than an hour, shall show a deficiency. It is the general rule that variation can be made in the test-burner by approaching the Board of Trade; but in the Peterborough clause, there is the broad power conferred on the Corporation and Company to vary, by agreement, the regulations affecting the testing, either in addition to, or in substitution of, any provision of the clauses.

The Interpretation of an Old Clause. The fact that the Corporations of Newcastle-under-Lyme and Burslem did not appear on clauses when the House of Lords Committee passed the Bill of the District Council of Wolstanton at the end of March last, caused us to expect that the two Corporations would carry their appeal to the House of Commons. This has proved correct. Since the Bill was before the Lords, certain private individuals added their weight to the side of the opposing Corporations; they taking up the stand that what Wolstanton are proposing to do will result detrimentally to them in respect of the price of gas. But, after considering the evidence, their fears may now appear to them to be groundless. During Thursday and Friday, the fight between the parties was carried on strenuously; and as the decision of the Commons Committee meant much to both sides, witnesses were driven hard by Counsel in the effort to obtain from them admissions or to weaken the case they were called to support. Briefly, it may be remembered that the Wolstanton Bill is a proposal to give to the District Council authority to purchase the Chesterton Gas Company's works under an agreement, and to take over the mains within the area of their jurisdiction belonging to the Burslem and Newcastle-under-Lyme Corporations, under the terms of clauses in the Acts which constituted those bodies or their predecessors the gas authorities of their districts in 1877. Powers to purchase the then supplying gas companies' works were given to Burslem and Newcastle with the condition attached that, if any outside authority desired to purchase the mains within their own district they could do so. There does not seem to have been any public discussion over these clauses in the parliamentary session of 1877; and therefore it may be taken that the arrangement was privately arrived at to avert opposition on the part of outside authorities. These old clauses were the cardinal points of discussion before the Committee last week. The Wolstanton District Council, their Counsel, and Consulting Engineers (Mr. Corbet Woodall and Mr. E. H. Stevenson) put the literal interpretation upon them, and contended that they meant what they plainly said—that, as Wolstanton desired to become the gas authority in their own district, they could purchase the mains of the Corporations within their area, in compliance with the enactment of 1877, without any other consideration. To the clauses of the Bill, the Corporations, their Counsel, and witness (Mr. W. A. Valon) considered that goodwill attached; or if the District Council simply purchased the mains, then the Corporations could come in, and lay others alongside in competition. In the "JOURNAL" for April 3 last, we fully discussed and gave reasons for the conclusion that the literal interpretation of Wolstanton was the correct one; and it is unnecessary to repeat the arguments then adduced. The Lords Committee were of opinion that the view of Wolstanton was the right one; and the Commons Committee have now confirmed their judgment, and have refused to strike out the provision in the Wolstanton Bill which will determine the rights of both Corporations in the district, and prevent them from troubling with attempted competition. We cannot help feeling some sympathy for the Corporations, but at the same time, as we said last April, Wolstanton cannot be blamed for obtaining the full advantage that it seems clear Parliament in 1877 intended they should have.

Compulsory Purchase. Barely two months ago, the Police and Sanitary Committee of the House of Commons passed the Bill of the Pontefract Corporation, in which powers of compulsory purchase over the Gas Company's works are sought; but the Committee hedged the power with conditions as to the time within which notice of purchase should be given, as to a reduction of the maximum price of gas from 5s. 6d. to 4s., and as to a tightening in of the period for the repayment of loans. In the Upper House, Lord Clifford of Chudleigh's Committee had the Bill before them on Thursday and Friday, and again yesterday. If their verdict is in favour of compulsory powers of purchase being conferred on the Corporation, the consequences, with such a lead before local authorities, may be far-reaching for private enterprise in the gas industry. Their Lordships were gravely told by Mr. E. H. Stevenson that the practice of Parliament has been to transfer such undertakings to local authorities; and there is hardly any case of which he knows where the proposal has been rejected. It has not been the practice of Parliament in the case of statutory gas undertakings, where there has not been agreement. But Mr. Stevenson put his statement in a manner which might lead a Committee to the conclusion that parliamentary agreement with compulsory transfers of statutory gas concerns is quite a common occurrence. It is always one of the anomalies of the Committee rooms that the eagerness of an authority to get possession of a gas-works is in inverse ratio to the eligibility of the property and business, as presented by the authority's witnesses. If a local authority are very anxious to purchase a gas-works (as in this particular case), then the management has been execrable, and the condition of the works—well, almost beyond description. We have here works reputed to be all behind the times, but greatly in excess of requirements, and having unique and historical features about them—that is, if we are to believe Mr. Stevenson, and, accepting Mr. Wilkinson's evidence, retorts that will not carbonize properly and yield to the fulness of similar retorts on other works. But with all the faults of the works, the Pontefract Corporation are of opinion that they will make a good investment for the town; and the terribly inefficient plant they are perfectly willing to work. What interpretation is one to put upon all this? What is to be extracted from it but amusement, tempered by pity? The conjunction of the names of Mr. Stevenson and Mr. Wilkinson in connection with this Bill, reminds us that six years ago Mr. Stevenson was the President of the Gas Institute; and Mr. Wilkinson read a paper at the annual meeting that year on "Some Disputed Points among Gas and Water Experts." That paper is well worth reading in considering the proceedings on this Pontefract Bill; and Mr. Stevenson's remarks during the discussion should not be overlooked. Mr. Wilkinson then wrote: "If we take parliamentary and arbitration evidence for the transfer of gas and water works, we again find ridiculous and outrageous differences of opinion." Perhaps during these proceedings Mr. Wilkinson has remembered those words. When the Pontefract Bill was before the Commons, it will be remembered that all that could possibly be said in detraction of the management and the works was said; but when it came to clauses, and the length of the period for the repayment of the loans, then a new light was thrown on the state of the works, and they were evidently in a condition that justified a longer period for repayment than that granted. But the degeneracy of management and works was again assumed when the parties reassembled before the Lords Committee. There were comments on the Bill when in the Commons (see "JOURNAL," May 8 and 15); and as then, so now. No complaint it appears was made of the Company until the question of purchase was mooted in the Council; and certainly outside the Council there was no desire for transfer. The whole evidence points to the fact that the ratepayers, led by an ambitious Council, are being invited to take a leap in the dark. If the Bill passes, and purchase is consummated, there will be little chance of a reduction in price for some time to come. Much better would the consumers be with the Company, if their parliamentary powers were revised and modernized, than they could ever hope to be with the undertaking under municipal control. Yesterday, Mr. Laurence Whittaker (the Company's Manager) and Mr. Corbet Woodall were among the witnesses called. At the rising of the Committee, the evidence had not been completed.

Wiring and Hiring. The London County Council have at last got through Parliament, after two or three previous trials, the electric wiring and fitting clauses for the Metropolitan Borough Councils. We do not anticipate that much harm will come from them, as (as is indicated in the opening paragraph of the "Notes") accruing experience is not at all favourable to this business as a profit-producing device, and, furthermore, as outgoings and income are to be so adjusted, with separate accounts, that the new branch of business is to be self-supporting, the power is likely to become a dead-letter. The Electrical Contractors' Association, in not being successful in this matter, have lost the grip that they were getting over local authorities who interfered with their business in this direction. They have had good success in the past; but this success of the London County Council will, we fear, cause authorities in the future to look a little contemptuously upon the demands of the Association to cease competition. The Association lost their chance of trying to overthrow the clause in the Commons; but in the Lords they did show conclusively how the possession of such powers as these can be made to work unfairly against local contractors. Local authorities can undertake work at unremunerative rates; they can, and officials do, impose difficulties where the contractors carry out installation work; and unqualified persons are said to be sent out as inspectors of their work. However, this evidence did not avail the opponents; the strength of the case against municipal trading being diminished by the finance adjustment provision. It is to be hoped that Mr. John Burns in the time to come, when accounts are to be kept in manner that "he who runs may read," will see that proper provision is made for the accounts of this auxiliary business.

Protecting Water Sources. The action of the Sutton District Water Company in promoting their Bill this session, apart from the protection that it is intended to give to their sources of water supply, may be described as public-spirited. The Bill was before Mr. Mooney's Committee last Tuesday and Wednesday; and a considerable amount of interest was evinced in it. The incentive to the promotion of the measure is a large well that the London, Brighton, and South Coast Railway Company are sinking not a great distance from the Water Company's sources of supply, and the water from which the former would, if not restrained, be able to send almost anywhere over their system. That they were contemplating distributing it within a radius of 6 miles from the well was convincingly shown by their willingness to be limited to that area, within which, of course, they might concentrate many big operations. The Water Company's Bill is intended to restrict the use of any water taken by others within their area to that area, and only beyond to the extent that private estates lie partly within the area and partly outside. This will limit the Railway Company's use of the water that they get from their well, if the Bill succeeds,

as we trust it will. It is a case where the law relating to underground water might do grievous injury to a large and growing community; and private interests must not be allowed to interfere with public and sanitary necessities. The Committee declared the preamble of the Bill proved; and accentuated their feelings in the matter by relieving Counsel for the promoters from replying.

Water for Great Yarmouth and Lowestoft. The Bill promoted jointly by the Great Yarmouth Water Company and the Lowestoft Water and Gas Company to increase their water resources by constructing works to take water from the River Bure, has been discussed before the Earl of Lauderdale's Committee. The Great Yarmouth Corporation and others were the opponents; but the main opposition turned on the question of the water being subjected to contamination, and therefore the propriety of accepting it as a source of supply was discussed. A great deal was heard about bacteria and organic matter; but eminent men of science, even one on the side of the opponents, declared that nothing was contained in the water that could with truth be said to be dangerous to health. However, the evidence the opposition produced had one good effect; for the Committee adjured the Corporation of Great Yarmouth to exercise their power to prevent pollution of the river. The Companies had to satisfy reports of the Home Office and the Local Government Board; and subject to this being done, the Bill proceeds.

OBITUARY.

We regret to record the death last Wednesday morning, in his 91st year, of Mr. CHARLES WOOSNAM, one of the founders, and for some years the Chairman, of the Southend Gas Company. Throughout his long life he had enjoyed exceptionally good health; but about nine months ago he was attacked by illness, which terminated fatally. His connection with the Southend Gas Company extended over 52 years. At an informal meeting held on Jan. 27, 1854, at the Hope Tavern, Southend, the expediency of a company being formed "for the purpose of supplying the town with gas" was determined upon. The resolution was moved by Mr. Woosnam; and it provided for the raising of a capital of £2000, in 400 shares of £5 each. He was one of the provisional Directors, all of whom have now passed away. The Company started as a private undertaking, under the title of the Southend Gaslight and Coke Company; and the balance-sheet for the year ended Dec. 25, 1856, shows that the amount received for gas, coke, tar, and fittings was £382 18s. 4d. By 1869, the year's revenue had gone up to £1433 13s. 6d.; and the latest figures, relating to the twelve months to December last, show that the income was £54,715. The Company was incorporated in 1877 as the Southend Gas Company; and a year later Mr. Woosnam, who had continued uninterruptedly in the capacity of Director, was elected Chairman. This position he held until May, 1901, when, owing to increasing years, he relinquished it in favour of his son, Mr. C. Frank Woosnam. He, however, retained his seat on the Board, and continued to display a close interest in the Company's proceedings. On March 7, 1904, the Company's Jubilee was celebrated; and the event also marked Mr. Woosnam's fifty years' directorship. A resolution was passed on the occasion in the following terms: "That it be recorded on the minutes of the day's proceedings that the hearty congratulations of the meeting be accorded to Mr. Charles Woosnam on having been a Director from the time the Company started." When he attained his 80th birthday, he was the recipient of a framed oil portrait of himself, bearing the following inscription: "Presented to Charles Woosnam, Esq., J.P., Chairman of the Southend Gas Company, by shareholders and friends, on his attaining his 80th birthday, and in commemoration of his services to the Company from its inception to the present time. 23rd Sept., 1895." Mr. Woosnam, who was held in the highest esteem in Southend, has left a widow, four sons, and three daughters. The funeral was fixed to take place at Southchurch yesterday.

Statue to Mr. Joseph Cowen.

A bronze statue, erected by public subscription, of the late Mr. Joseph Cowen, for many years Member of Parliament for Newcastle, was unveiled last Saturday afternoon by the Right Hon. Viscount Ridley; and thus was perpetuated the memory of one whose life was lived on Tyneside, and who devoted his energies and his abilities to the service of his fellows. The ceremony, which took place at two o'clock, was simple and short. At the request of Alderman Goolden, the Chairman of the Cowen Memorial Committee, his Lordship pulled a cord; and the covering dropped from the statue, which is the work of Mr. John Tweed. This important local event calls for notice in our columns from the fact that the name of Cowen, as our readers are aware, is identified with the fire-clay industry, which was established at Blaydon Burn nearly 160 years ago. The first gas-retorts were made there in 1826; and the firm's goods have ever since been celebrated all over the world. The late Mr. Cowen was well known to many members of the North of England Association, from his attendance at their meetings.

NEWSPAPER FALLACIES CONCERNING CARBONIC OXIDE IN COAL GAS.

IN this country, we have been rather free of late from false newspaper scares alleging terrible things against either the composition or use of illuminating gas. All, of course, will remember the outcry, some years ago—from faddists or extremists among the ranks of medical men or hygienists—with regard to the use of carburetted water gas, which even led to the appointment of an official Committee of Inquiry. In a few still unenlightened towns, there may yet linger fears of danger and catastrophe from the use of water gas, and even from coal gas in certain forms; but such old-fashioned prejudices are at present hardly articulate. Common sense and reason, combined with practical daily demonstration of the fallacy of such fears, have won the day. But in Paris alarm was raised in connection with the use of water gas for the lighting of the City on the termination of the last concession; and also in March a certain Paris paper stated that gas was responsible for the anæmia of the Parisians—using the name of M. Armand Gautier, who is a member of the Academy of Science, to support their inane suggestion. At the recent congress of the Société Technique du Gaz, M. Ph. Delahaye took the matter up, and exposed the absurd fallacy of the newspaper contention.

He pointed out at the commencement of his paper that vague allegations emanating from leaders of science, which get reproduced in the daily newspapers, warp the public's judgment, and give rise to beliefs against which neither sound reasoning nor facts, however well established, can prevail. As an instance of this, he cites a letter written by M. Vieille, when Vice-President of the Council of Hygiene and Health of the Seine district, in which he said: "Hygienists have established the connection of carbonic oxide not only with the usual accidents from small leakages [of gas], but also to a large extent, with the indisputable anæmic tendency which prevails in crowded centres." Such a general assertion coming from a scientific authority is in danger of being accepted by people without discussion, and then it passes as an axiom of hygiene by universal consent.

But to return to the newspaper article. This referred to escapes of gas which charged the atmosphere with carbonic oxide. "Even in the street," the article stated, "we are continually poisoned by escapes of gas—that is, carbonic oxide. Paris has more than 1000 kilometres (621 miles) of gas-mains; and in the best pipes there is 10 and sometimes 20 per cent. of gas lost. This gas filters through the soil of the street, and is mixed with the air that we breathe. M. Armand Gautier has calculated that 8 litres of carbonic oxide (0·282 cubic foot) escape from each square metre of ground in Paris in 24 hours." It would have been easy for the anonymous writer of this article to have taken the report of the Paris Gas Company for 1904, when he would have seen that the unaccounted-for gas amounted to 16,062,071 cubic metres (or about 567,257,000 cubic feet) for 2,575,136 metres of main pipe (about 1600 miles), excluding the service-pipes.

M. Delahaye then gave official figures which show that the total surface of Paris roads is 16,357,570 square metres. Now applying the figure of 8 litres per square metre, we get 130,860,560 litres of carbonic oxide as daily given off from the ground, supposing that the road materials are all equally permeable. This carbonic oxide has itself no reason for rising from the ground, for its specific gravity is 0·968 as compared with air. The amount of carbonic oxide would also be 16 ten-thousandths—a quantity more than sufficient to produce anæmia, and quite enough to start killing off some amongst us, because, according to Dr. Bruneau, a fatal dose is 50 ten-thousandths. This amount of 130,860 cubic metres of carbonic oxide per day corresponds to an annual loss of 800 or 600 millions of cubic metres of gas, according as to whether one calculates 6 or 8 per cent. of carbonic oxide. The total unaccounted-for gas of 16,062,071 cubic metres in Paris in 1904 cannot, therefore, be accused of supplying the atmosphere of the capital with a quantity of carbonic oxide that even the author of the newspaper article did not calculate.

M. Delahaye also searched the reports of M. Armand Gautier to see if any justification could be found for the newspaper writer's assertion as to the 8 litres of carbonic oxide per square metre per 24 hours. Needless to say, no statement of the kind had been made; and the reports of M. Gautier on the nature of the combustible gases found in the air of Paris, and on a method of ascertaining the presence of carbonic oxide in the air, are given in an appendix to M. Delahaye's paper. He concludes by saying that the allegations made in the Paris newspaper do not rest on any solid basis. They are the outcome of imagination, without the slightest desire for accuracy, truth, or even probability. Perhaps to notice them gives them more importance than they deserve. But the object of the paper was to have ready a reply when carbonic oxide again comes to be used as an excuse for an attack on illuminating gas.

At a meeting of the Hereford Town Council held last Tuesday, Mr. W. W. Townsend was unanimously appointed Manager of the gas-works, in succession to Mr. W. Parlby. Mr. Townsend is at present Deputy-Manager of the Warrington Corporation Gas-Works, and is the eldest son of Mr. H. Townsend, the Engineer of the Wakefield Gas Company.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

FORTY-SIXTH ANNUAL MEETING.—BREMEN, June 27 to July 2, 1906.

REVIEW OF THE PROCEEDINGS.

(*Continued from p.* 23.)

[From Our Own Correspondent.]

Resuming the review of the proceedings at Bremen at the point where my report in last week's "Journal" necessarily became little more than an epitome of the programme, owing to the exigencies of time and distance, I may give a few further notes on Professor H. Drehschmidt's lecture on "The Position of Incandescent Gas Lighting." He pointed out that with the inverted burner, given appropriate manipulation, the consumption of mantles is very low. Chemical modes for the ignition of incandescent gas-burners are not very suitable, because their action is gradual. Baron Auer von Welsbach has discovered a new material for igniting gas—viz., a mixture consisting of 30 per cent. of iron and 70 per cent. of cerium. With this a spark is produced by the friction of turning on the tap. It is hoped that this new process will put an end to the difficulties hitherto found with chemical modes of ignition. The use of gas under high pressure for incandescent lighting gives a high duty and very satisfactory results. A considerable gain is generally achieved by the insertion of pieces of insulating material between the burner proper and the fitting, in order to avoid as far as possible the transmission of heat from one to the other. The author had made many observations on the "Selas" light, the "Millennium" light, and other high-pressure burners, and on the Graetzin and other inverted gas-lights, for street-lamps. Exhaustive investigations in the streets of Berlin and elsewhere had shown that these sizes of gas-burners afforded more uniform and more economical street lighting than electric arc lamps. The inverted gas-burner had been greatly improved, and was now eminently suitable for street lighting. A large number of Graetzin inverted burners had been installed on street-lamp standards in the more important streets and open spaces in Bremen; and their good effect was greatly admired by those present at the meeting. The Graetzin inverted burner in different types, and "Selas" burners of several sizes, were also shown at the small exhibition of gas appliances held in connection with the meeting, and generally evoked very favourable comments from the visitors.

The paper by Dr. E. Liebenthal, of Berlin, on the ratios which have been established at the Imperial Physical-Technical Institute ("Reichsanstalt") at Charlottenburg between the intensities of the Hefner, Harcourt, and Carcel standards of light, which, as already reported, was read on the 28th ult.,* is of considerable interest to gas men and photometrists generally; and while reports of the similar work which it is understood has been carried on simultaneously in France and at the National Physical Laboratory at Teddington may be expected, it is improbable that the results that were reported by Herr Liebenthal will be controverted thereby. The ratios of 1, 11, and 10·8 for the mean lighting power of the Hefner, the Harcourt, and the Carcel standard lamps, under normal conditions may be taken as established. The old ratio of 1 to 1·14 for the Hefner unit and the English candle was found by researches at Charlottenburg, in which so-called English candles of comparatively recent date were burned under abnormal conditions—*i.e.*, the wicks were manipulated so that a constant and arbitrarily established height of flame was maintained. It is a pity that these earlier researches were not made either directly on the one-candle Harcourt pentane air-gas flame (not the later one-candle lamp made by Messrs. Woodhouse and Rawson, which has been investigated by Dr. Liebenthal), or on candles which had been verified by comparison with that flame, as Committee after Committee who have reported on the conditions of gas photometry in England have declared that that flame truly represents the mean value of the light of the English standard candle. The researches on the ten-candle Harcourt standard, of which the report was given by Dr. Liebenthal at Bremen, confirm the suspicion which has been prevalent that the so-called "English candles" used in the earlier Charlottenburg comparisons were not truly representative of the average English parliamentary sperm candle. It must not be forgotten that the conditions of the supply of spermaceti, and therefore of its quality, have materially altered during the past thirty years; and but for the standard of reference provided by the Harcourt one-candle flame, it would be impossible to say that any candle at the present time gave a light representing the average light of the sperm candle of the early Gas Acts. Now, however, we have also the ten-candle Harcourt lamp, which is known to represent the average light of ten "candles," as defined by the earlier one-candle standard air-gas flame; so all references to ratios established with *pseudo* or doctored English candles may henceforth be disregarded. The ratio now established has the incidental but great advantage of being represented by a round figure—it is easy to remember that ten English candles (*i.e.*, the Harcourt ten-candle standard) equal, under normal conditions, exactly 11 Hefners. For the rest, the Harcourt standard appears to have come out of the ordeal of comparison as well as might have been expected; and the greater convenience for practical gas photometry of a relatively large unit, which attains its normal intensity in ten minutes after lighting up, dispenses with a glass chimney, and is of approximately the same tint as the standard gas-flame, will always give it a great advantage over the small and red Hefner flame, and all other standards hitherto proposed which have any pretensions either to accuracy or representative character.

The proceedings relating to water supply opened on Friday, June 29, with a description by Herr E. Götze of the "Water Supply Undertaking of Bremen." There was nothing specially noteworthy about this. The intake is on the left bank of the Weser; and there are 24 filter-beds, with a total surface of nearly 260,000 square feet. Clarification is effected as occasion demands, by an addition of 1 to 2 parts of aluminium sulphate to 50,000 parts of water. The average supply of water to the population of 217,000 amounts to about 6,600,000 gallons, or a trifle over 30 gallons a head.

Herr G. Anklam, of Friedrichshagen, near Berlin, next described the "Water Supply of Berlin," an old theme rendered topical by references to the new works now being erected on the Müggelsee. Much interest was displayed in this scheme. Herr Schertel gave a paper on the "Water Supply of Hamburg."

The next paper, on the "Development of Machinery for Water-Works," was by Herr Reese, of Dortmund. He referred especially to the use of turbines, and generally to the development of mechanical methods of handling material, &c. Much interest was aroused by a paper by Dr. W. Wolff, of Berlin, on the "Divining Rod." After quoting instances of its abuse, the author urged that the use of such an unscientific instrument should be strenuously opposed.

An interesting paper was read on June 30 by Herr Dieterich, of Leipsic, on "Coal and Coke Conveying Apparatus in Gas-Works." He referred to existing examples of various types of conveying plant at the gas-works at Mariendorf (Berlin), at Schiedam and Groningen in Holland, at Neuss, and at the new municipal gas-works for Berlin at Tegel-Wittenau. He showed views and diagrams of the plant (much of which is already familiar to readers of the "Journal" from earlier communications), and in conclusion gave the following summary of the cost of transferring coal from the ship to the retort-house.

Mariendorf Gas-Works. (125,000 Metric Tons per Annum.)		Schiedam Gas-Works. (40,000 Metric Tons per Annum.)	Cost.
Light Railway.	Rope Traction.	Electric Suspension Line.	
40,000	21,000	5200	Marks per annum.
32·0	16·80	13·0	Pfennige per metric ton.
3·9	2·05	1·6	Pence per English ton.

The plant to which the author referred had throughout been supplied by the firm of Adolf Bleichert and Co., of Gohlis, near Leipsic, who had many views of conveying plant erected by them at the exhibition of gas appliances.

On Saturday, the 30th ult., Herr E. Prinz, of Berlin, read a paper, which had been held over from the preceding day, for lack of time, on "Keeping the Subsoil Dry by Means of Lowering the Underground Water;" and then a paper by Professor Schiemenz was read on the subject of the "Estimation of the Purity of Surface Water by Reference to the Larger ("Macroscopic") Animal and Vegetable Life Therein." The author endeavoured to show that the ordinary biological methods for the examination of water were, apart from chemical methods, inadequate to discriminate between different degrees and descriptions of contamination. He had found that a number of animals lived in the water which were extremely sensitive to particular organic impurities; while another set chose for their *habitat* water in which such impurities abounded. From the occurrence of various types of animal life, all readily visible with the naked eye, tolerably trustworthy conclusions could be drawn as to the nature and extent of organic contamination. By similar methods, also, the amount of carbonic acid, and the amount and nature of saline constituents, could be inferred. The nature of the animal and vegetable life, if present, enabled conclusions to be drawn as to the actual origin of the contamination—*e.g.*, whether it was domestic sewage, factory effluent, or what not, which was responsible for the impurity of water. This paper, putting forward as it did a novel means of gauging the degree of purity of surface waters, was much appreciated by those present.

* A full translation of the paper will be found on p. 102.—Ed. J.G.L.

The papers read at the meeting have now all been referred to; but the proceedings on Saturday included the presentation of the reports of the various Committees appointed and financed by the Association for the investigation of numerous problems of interest to gas and water works engineers. These reports were, in several instances, noteworthy documents covering research work of great value.

The report of the Photometric Committee was presented by Dr. Krüss, of Hamburg, in the absence of the Chairman of the Committee, Dr. Leybold. A matter of importance reported upon was the question of the effect of high-pressure distribution on the illuminating power and calorific value of gas. The results of researches on the effect of the admixture of various proportions of simple ("blue") water gas with coal gas on the illuminating value of the gas in the incandescent burner, were also given in the report. The Committee received a grant of 500 marks for the pursuit of further researches in both these directions.*

The report of the Committee on Heating was presented by Dr. E. Schilling, of Munich, the Chairman. After a brief reference to the work done in 1904 on the indirect lighting of school-rooms, &c., by gas and electricity, it proceeded to state the results achieved by it in modifying the onerous and almost prohibitive conditions which it had been feared would be imposed in Prussia, at the instance of Professor Rietschel, in respect of the installation of gas-fires in dwelling-houses. The pioneer work effected by Herr Schäfer, of Dessau (whose absence from the meeting, through a family bereavement, was much deplored), in combating the proposals of Professor Rietschel, has already been described in the "JOURNAL;"† and it is gratifying to see that it and the labours of this Committee have borne such good fruit. The report also dealt with the use of gas coke in installations for heating from a central point or station.

The report of the Committee on Gas-Meters was presented by Herr H. Söhren, of Bonn, on behalf of the Chairman, Herr C. Kohn, of Frankfort-on-Maine. It referred to the sudden death, on May 31 last, of one of its members—Dr. Homann. The valuable work reported last year on the effect of various hydrocarbons, &c., on the sheepskin or leather used for the diaphragms of dry meters has been continued.

The Committee on Water Statistics presented a report, through its Chairman, Herr Reese, of Dortmund.

The Committee responsible for the most voluminous, and withal the most valuable, report presented at this year's meeting was that which dealt with Earth Currents. The Chairman of this Committee is Mr. W. H. Lindley, of Frankfort-on-Maine. An addendum to the report was a paper by Professor F. Haber, of Carlsruhe, on "Vagrant Tramway Currents, and the Endangering therefrom of the Distributing System in Carlsruhe." Justice to these two valuable communications can only be done by an exhaustive summary of their contents; and all gas and water engineers who have electric tramway systems within their districts should not fail to read the summaries when they appear in the "JOURNAL." The Committee asked for, and obtained, a grant of 6000 marks for the pursuit of their investigations in the ensuing year.

The reports of the Instructional Committee and of the Committee for the Teaching and Experimental Gas-Works of the Association were both presented by Professor H. Bunte, of Carlsruhe. I shall be giving, in due course, a summary of the first report. In the second, Professor Bunte's name was associated with that of Herr Reichardt. The plans of the experimental gas-works were published in the "JOURNAL" last year.‡ Their erection was begun on Aug. 8 last; but various causes have delayed the completion, and it is now predicted that the retort setting and apparatus will be set up and the laboratory equipped in three or four months' time. Some enlargements have been sanctioned of the original project. It is reported that the appeal to gas undertakings for financial assistance for the furthering of the erection of the works and their maintenance has met with a most favourable response—19,565 marks having been subscribed during the year. It is stated that while, owing to the aforementioned delays, the work of the laboratory could not be started by the present time, something has been done in the way of preparation for its future activity. A circular has been addressed to gas-works inquiring as to the descriptions and quantities of gas coal used; and it has met with a ready response. The Association are therefore now possessed of statistics which will serve as a valuable guide regarding the descriptions of coal which should be investigated. The chemical examination of a few coals has indeed, pending the completion of the experimental works, already been put in hand at the Chemical Technical Testing and Experimental Institution of the Grand Duchy of Baden.

A summary of the statistics collected was laid before the meeting. They relate to all German gas-works with a make of 1 million cubic metres (35,300,000 cubic feet) of gas per annum and upwards, and to a number of smaller gas-works. The total, reckoning separately the several works belonging to certain companies and corporations, from which reports have been received is 310. An aggregate consumption of 4,462,567 metric tons of coal by these works in the year 1904-5 is reported. The consumption of the remaining 700 smaller gas-works in the German Empire may be taken as aggregating a further 1 million tons, and the total consumption of all German gas-works to be, therefore, about 5½ million metric tons. The 4½ million tons of coal of which the origin is reported are derived from the following sources:—

Ruhr district	about	31·0	per cent.	of the total.
England	,,	25·0	,,	,, ,,
Silesia	,,	20·0	,,	,, ,,
Saar district	,,	17·0	,,	,, ,,
Saxony	,,	6·0	,,	,, ,,
Bohemia	,,	0·7	,,	,, ,,
Various cannel . . .	,,	0·3	,,	,, ,,

The supply of Ruhr coal is distributed tolerably uniformly between a number of mines, of which the Ewald, Rhein-Elbe and Alma, and the Mont Cenis all contribute over 100,000 tons apiece. Upper Silesian coal for gas-works comes mainly from the well-known Königin-Louise mine, which provided more than 450,000 metric tons. No other Upper Silesian mine furnished above 100,000 tons, and only one Lower Silesian mine—the "Glückhilf-Friedenshoffnung," which was responsible for a supply of 130,000 metric tons. Saar coal came most largely from the Heinitz-Dechen mine, which provided nearly 390,000 metric tons. The most prolific source in Saxony is the Wilhelmschacht mine, which furnished over 80,000 metric tons. A catalogue of the German gas-coal mines, with their ownership, displays the suggestive fact that the majority of the owners of the large mines are members of the Rhenish Westphalian Coal Syndicate. This is a powerful combination, which is already in a position to dictate its own terms and conditions to gas-works in most parts of Germany arranging for supplies of gas coal. In other parts some relief is found in access to the English coal market; and the removal of the export duty on British coal may lead to still greater supplies being drawn from England in the near future—if the German Coal Syndicate continues its arbitrary methods of dealing with gas undertakings.

This concludes my review of the technical proceedings at the recent meeting at Bremen. The meeting suffered somewhat from too full a programme, to fulfil which it was at times necessary to restrict profitable debate. The report of the festivities in connection with the meeting would, however, be incomplete without further reference to the whole-day sea-trip round Heligoland, on Sunday, the 1st inst. Some 750 members and guests of the Association journeyed by train to Bremerhaven in the early morning, in acceptance of the invitation given by the North German Lloyd Steamship Company. The steamship on which they embarked was the *Wittekind*, a vessel of about 8000 tons, and therefore well adapted to ride comfortably the rather heavy seas encountered. She had been specially fitted up for the occasion, so that the whole party could be served at the same time with the liberal meals given them by the Company. The Continental late breakfast, midday coffee, and a really excellent afternoon dinner, with appropriate wines, were provided by the world-famed steamship line for the delectation of their guests, who, needless to say, were much gratified by the delightful trip and the unstinted generosity of its donors.

REPORTS OF THE COMMISSIONS APPOINTED BY THE GERMAN ASSOCIATION.

I.—THE PHOTOMETRY COMMISSION.

The report of the Photometry Commission submitted to the German Association of Gas and Water Engineers at their recent meeting is signed this year by Dr. Leybold, of Hamburg, the new Chairman; his predecessor (Herr Thomas, of Zittau) having died on Aug. 16, 1905.

EFFECT OF LONG-DISTANCE TRANSMISSION.

The first portion of the report is taken up with a description of the experiments carried out at Lübeck to investigate the effect of long-distance transmission upon the illuminating power and the calorific value of gas. The Commissioners remark that a good many figures have already been collected which deserve to be placed on record, but that further study of the question is still desirable, partly to ascertain the comparative effects of transmission over different distances and at different pressures, and partly to see how the transmitted gas is affected during low winter temperatures. Up to the present time, two different transmission systems have been examined. The first was a 12-inch main, 1½ miles long, used to convey the gas, under the pressure given by a Roots blower, made at the second gas-works at Lübeck, to the holders at the first works. The second system was a 3·15-inch main, 12·1 miles long, employed to convey gas made at the first gas-works to the neighbouring town Travemünde. The actual tests of the illuminating power and calorific value were performed by Dr. Leybold and Herren Hase and Paap. The illuminating power was measured in an argand burner, working at the constant rate of 5·3 cubic feet per hour, on a Lummer-Brodhun photometer, with a Hefner standard lamp; and the calorific value was determined in a Junkers calorimeter, the figures quoted being the net values reduced to a pressure of 760 mm. and a temperature of 15° C.

* An abstract translation of this valuable report follows our Correspondent's report of the proceedings; and the other reports will be dealt with subsequently.—ED. J.G.L.

† See Vol. XCI., pp. 38, 752.

‡ See Vol. XCI., p. 35.

The tests of the shorter transmission system have led to the curious result that the gas lost a small proportion of its original calorific power, but gained more than a negligible amount in illuminating power. It should, however, be observed that the gas tested was not a well-mixed sample taken from a holder, but freshly-made gas coming direct from the plant. Hence it naturally varied considerably in quality from time to time, and was able to deposit or re-absorb benzol during its passage through the main. The original gas was also taken for testing purposes from an outlet just after the blower.

The phenomena of the longer transmission system were examined at three different pressures. When the natural holder pressure of 5·4 inches was employed, the gas was found to exhibit a fairly constant mean illuminating power after arrival at Travemünde, although it varied in this respect at the Lübeck works. When the illuminating power at Lübeck was above the normal, it was lower at Travemünde than at Lübeck, and *vice versâ*. Presumably the gas deposited heavy hydrocarbons in the transmitting main on some occasions, and absorbed them on others; for no condensed matter was discovered in the syphon boxes. The specific gravity of the gas decreased slightly during its passage through the main, and the calorific value diminished on an average by 2·03 per cent. During the time occupied by these tests, the mean temperature of the air was 38·12° Fahr.; the maximum being 57·02° Fahr., and the minimum 26·24° Fahr.

When the original pressure was 59 inches, the gas suffered an average loss in illuminating power of 6·89 per cent., and in calorific value of 1·99 per cent.; its specific gravity also fell somewhat. The comparatively more serious loss in illuminating power may be explained by the richer quality of the gas made at Lübeck; and it is therefore adventitious. As in the former case, the illuminating power of the gas on arrival at Travemünde remained sensibly constant. Tests at a higher transmitting pressure of 98 inches were commenced too late in the season for their results to be fully included in the report. The mean air temperature during the last two series of tests was 35·06° Fahr., the highest was 48·56° Fahr., and the lowest 25·16° Fahr.

Hence it may be said that the above-described tests of gas before and after long-distance transmission show that it loses about 3 per cent. in illuminating power and about 2 per cent. in calorific value during its journey. In future experiments, the temperature of the ground will be observed, in order to see if it affects the gas in the main.

During the tests above described, it was found that if the volume of the gas arriving at the far end of the transmission system was recalculated to that corresponding with its initial pressure, the volume so obtained was smaller than the volume given by Dr. Pole's formula. Hence the co-efficient of friction is higher in the pressure main than that adopted in the formula, though it falls as the pressure rises. If, however, the gas volumes inserted in the formula are not those of the compressed gas, but of the gas at the holder pressure, the co-efficient of friction falls still more, until, at higher pressures, the volumes actually delivered are larger than those calculated. More correct results are given by the formula quoted in the "Journal für Gasbeleuchtung" for 1904 (p. 898), provided the co-efficient of friction is taken at 0·0039 instead of 0·003. This formula gives the correct gas volumes as calculated for the initial pressure, as long as the co-efficient of friction remains unaltered.

On the whole, therefore, the Commissioners consider that, so far as their investigations have gone, there is no evidence that gas suffers appreciably by transmission over long distances at high pressures.

Non-Carburetted Water Gas in Incandescent Burners.

In a former report, experiments were described upon the effect produced on the illuminating power of an incandescent burner of increasing proportions in the coal gas of water gas carburetted by the hot process. It was pointed out that since the specific gravity of oil-carburetted water gas is higher than that of coal gas, the consumption of a burner fitted with one particular jet must decrease as the proportion of water gas increases, and that therefore the pressure must be raised concurrently with increases in the proportion of water gas if the burner is to pass a proper volume of gas. Moreover, the shape of a water-gas flame, whether carburetted or not, is different from that of coal gas, being smaller and consequently hotter. The differences between the calorific values of the oil-carburetted water gas and the coal gas examined on the former occasion were not serious; being 14 per cent. in one case and 5 per cent. in the other. The results of the tests showed that with rising consumptions the illuminating power of the burner (mantle) increased notably as the proportion of the carburetted water gas present were the greater, and also that the efficiency of the burner, or the illuminating power developed per unit volume of gas consumed, rose similarly; provided, of course, that the primary air supply was regulated by manipulating a ring round the jets until the maximum quantity of light was given. With pure coal gas, a maximum illuminating power of 92·2 candles was obtained with a consumption of 3·71 cubic feet per hour at a pressure of 0·984 inch; whereas when the gas contained 60 per cent. of carburetted water gas the maximum illuminating power was 87·8 candles for a consumption of 4·24 cubic feet per hour at a pressure of 1·58 inches. On the whole, it appeared that there was no objection to adding to coal gas up to 20 or 30 per cent. of oil-carburetted water gas, and that, at the pressures prevailing during the evening and at night in a distributing system, such a mixed gas could be consumed without necessitating alterations in the existing burners.

The problem before the Commission during the past year has been to ascertain the effect of using as a diluent, not carburetted, but ordinary non-carburetted, or "blue," water gas. The presence of blue water gas alters considerably the conditions obtaining at the burners; for the difference in calorific value between coal gas and blue water gas is 40 or 48 per cent. Again, as the proportions of air needed by the two gases are different, and the flame of blue water gas is much shorter than that of coal gas, it is evident that a much larger volume of the mixed gas than of pure coal gas must be consumed by a burner if the mantle is to be properly filled with flame.

The effect produced on the illuminating power of a mantle by increasing proportions of blue water gas in the coal gas burning under it, is summarized in the annexed table. It should, however, be observed that the mantle employed was a good deal bellied out at its upper part, so that its cubical contents were large. The air supply was in all cases adjusted to its most favourable amount. Each variety of gas was tested at all the rates of consumption quoted; but only those figures are reproduced in the table which correspond with the most advantageous rate of consumption for the particular variety of gas under test.

Ratio of Coal Gas to Water Gas by Volume.	Net Calorific Power B.Th.U. per Cubic Foot.	Specfic Gravity 15°C. 760 mm.	Pressure in Inches.	Consumption per Hour.		Candle Power.	Duty.
				Litres.	Cub. Ft.		
Pure Coal Gas.	489	·360	0·59	120	4·24	66·8	15·8
20 : 1	478	·376	0·75	130	4·59	68·7	15·0
10 : 1	469	·385	0·91	140	4·95	70·2	14·2
5 : 1	451	·397	1·18	150	5·30	72·6	13·7
5 : 2	431	·415	1·38	160	5·65	75·9	(12·6 or 13·4)
5 : 3	412	·422	1·62	170	6·00	76·8	12·8
5 : 3	412	·422	1·81	180	6·36	81·4	12·8
5 : 4	397	·438	1·93	180	6·36	77·6	12·2
5 : 5	393	·500	2·40	190	6·71	79·0	11·8

As already stated to be the case with mixtures of coal gas and carburetted water gas, the results now submitted prove that when coal gas is diluted with non-carburetted water gas, the volume of mixed gas led to a burner must be increased as the proportion of blue water gas rises, if the mantle is to be properly heated, and is to afford a satisfactory amount of light. Increasing proportions of oil-carburetted water gas lead to higher efficiencies; but increasing proportions of blue water gas lead to lower ones at the burner. This difference in behaviour is to be explained by the decreasing size of the flame as the proportion of blue water gas is raised; the gas being then oxidized before it reaches the surface of the mantle. Hence, if the proportion of water gas present is uniformally high, the shape of the mantles should be altered to suit the shorter flames.

The Commissioners have prepared a set of photographs of atmospheric gas-flames (without mantles) showing clearly how the size of the flame is reduced by increasing proportions of water gas; and it is intended to pursue this most interesting investigation during the current year.

Water-Gas Plant for the Berlin Gas-Works.

The authorities of the city of Berlin have recently decided on the construction of installations of water-gas plant at all the municipal gas-works. The two installations at the Danziger-strasse and Gitschinerstrasse stations will be constructed by the Deutsche Wassergas Beleuchtungs Gesellschaft, and will be of the Dellwik-Fleischer type. They will comprise nine generators of a total daily capacity of about 5,600,000 cubic feet. The installation at the Schmargendorf station will comprise three generators of a total daily capacity of about 2,100,000 cubic feet. This order has been given to the Köln-Bayenthal Company, of Cologne. The order for the installation at the Tegel station has been placed with Messrs. Julius Pintsch and Co., of Berlin, the representatives of Messrs. Humphreys and Glasgow. There will here be six generators, of a total daily capacity of about 2,800,000 cubic feet. All the plants will be adapted for producing either "blue" or else carburetted water gas.

Cost of Factory Lighting.—A paper on this subject was read by Mr. A. Pollitt at a recent meeting of the Textile Workers Managers' Association. Taking as his basis the provision of 20,000-candle power, Mr. Pollitt gave the following estimate as the total cost per hour for the several forms of light most commonly used: Ordinary flat-flame gas-burner 18s. 3d., incandescent mantle 4s. 9·18d., Welsbach self-intensifying burner and mantle 4s. 4·6d., compressed gas 4s. 0·19d., incandescent electric lamp 13s. 2·68d. and electric arc light 4s. 6·44d. Gas is reckoned at 2s. 6d. per 1000 cubic feet; but the price of electricity per unit is not given.

HEFNER, HARCOURT, AND CARCEL LAMPS.

PHOTOMETRIC INVESTIGATIONS BY THE PHYSICAL-TECHNICAL IMPERIAL INSTITUTE AT CHARLOTTENBURG ON THE RELATION OF THE INTENSITY OF LIGHT OF THE HEFNER LAMP TO THE TEN-CANDLE PENTANE LAMP AND THE CARCEL LAMP.

By Dr. Emil Liebenthal, of Berlin.

[A Paper read before the German Association of Gas and Water Engineers.]

The international resolutions passed in the years 1884, 1889, and 1896 with regard to the selection of an international unit of light have not resulted in uniformity in regard to it. The Hefner lamp, which was adopted in 1896 at Geneva as the practical international unit measure of light, is even at the present time only in use as such in Germany. In France, as a rule, the carcel lamp, and in England the English candle, and since 1898 the 10-candle pentane lamp as well, are used.

The International Photometric Committee, which was constituted by the first International Congress of Gas Engineers on the occasion of the Exhibition in Paris in 1900, at their sitting in Zurich in 1903 again took up the question of an international regulation of units of light. Its proceedings were then governed by two tables which Herr Bunte had prepared for the purpose from older measurements.*

Recognizing that, for the time being, there was no prospect of the introduction of a really universal unit of light, the Photometric Committee at Zurich confined themselves to an endeavour to establish generally accepted ratios between the units of light in use in the different countries. It was then decided: (1) That in Germany, France, and England new comparative photometric testings should be made between the Hefner lamp, the ten-candle pentane lamp, and the carcel lamp; and (2) that for the time being the ratios shown by Herr Bunte to be the most trustworthy should be adopted for conversions—viz.,

$$\frac{\text{Intensity of light of ten-candle pentane lamp}}{\text{Intensity of light of Hefner lamp}} = 11{\cdot}4$$

and

$$\frac{\text{Intensity of light of carcel lamp}}{\text{Intensity of light of Hefner lamp}} = 10{\cdot}9$$

Exhaustive comparative tests have been carried out in the Reichsanstalt in accordance with the first conclusion. The source of light used for the comparisons was a constant incandescent electric lamp. The humidity of the air varied between 3 and 17 volumes per 1000 volumes of dry air free from carbonic acid; the barometric height varied between 742 and 772 millimetres.

Two of each of the foreign lamps were used. They were placed at the disposal of the Reichsanstalt by the German Association of Gas and Water Engineers through the medium of Herr Bunte. Screens were placed in front of the lamps, allowing the light to pass, but screening off the parts of the lamps.

The Ten-Candle Pentane Lamp.

This lamp consists of a Sugg type of argand burner, fed with pentane air gas, which is obtained by the air traversing a reservoir charged with pentane, and furnished with a series of chambers placed above the burner, so that the air becomes thus carburetted with pentane vapour. The reservoir is connected with the burner by means of an india-rubber tube. A metal chimney induces a strong draught of air, and screens off the upper part of the flame. The internal supply of air for combustion is previously warmed. The chimney has an inspection window, with a horizontal mark at about its middle. The flame must, according to the prescription, be so regulated that its tips are midway between the lower edge of the inspection window and this horizontal mark. The height of the flame falls continuously for the first few minutes after lighting, so that the gas supply has to be correspondingly increased. After about 10 minutes, the lamp attains a nearly stationary state, and then requires, in contradistinction to the one-candle pentane wick lamp, no longer constant supervision. The light rises very rapidly at the beginning, and after about 10 minutes attains a nearly constant value.

The ten-candle pentane lamp proves much more sensitive than the Hefner lamp towards vitiation of the air. When the photometer-room at the Reichsanstalt, which is sufficiently large (16,600 cubic feet), was aired before the beginning of a test, but not again during it, the light of the Hefner lamp decreased by about 2 per cent. at the extreme after three hours had expired, while the light of the ten-candle pentane lamp frequently decreased by the same amount after twenty minutes had expired. According to Harcourt, the light of the pentane lamp does not vary if the flame fluctuates by as much as 6 millimetres above or below the prescribed height. According to the tests of the Reichsanstalt, this is nearly right if the flame is higher than prescribed, but not if the flame is smaller. If the points of the flame play about the lower edge of the inspection window, the light is about 3 per cent. lower than the normal. For exact measurements, this lamp must therefore be regulated to a particular height of flame—like the Hefner lamp and the one-candle pentane lamp.

One of the two pentane lamps was accompanied by a certificate of the London Gas Referees as to the correctness of its measurements. With the other lamp, deviations from the dimensions given by the Gas Referees were not found. The height of flame was regulated according to the prescription. The testing was begun about ten minutes after lighting up. Each time at least two measurements were made, both consisting of the mean of ten photometric settings. In order to avoid vitiation of the air, the photometer-room was aired before each measurement. The flames were not regulated by means of the taps on the carburettor, but by a pinch-cock on the rubber tube connecting the carburettor with the burner. The latter arrangement admitted of the observer controlling the height of the flame at a relatively great distance from the lamp. But, notwithstanding these precautions, the variations in the light of one and the same lamp with the same fuel and under the same meteorological conditions amounted to upwards of 1 per cent. in the course of several hours. The light of the portion of the flame that was beneath the lower edge of the chimney was measured in accordance with the prescription.

Three descriptions of pentane were used in the testings: (1) English pentane —*i.e.*, made in England, and sold by the firm of Carless, Capel, and Leonard, of London. (2) Three batches of pentane made in Germany by the firm of C. A. F. Kahlbaum according to the prescription of the Gas Referees. (3) So called "Kahlbaum pentane" stated by the firm to be a simple chemical body of the formula—

$$\frac{CH_3}{CH_3}\!>\!CH - CH_2 - CH_3$$

Descriptions 1 and 2 were tested in the chemical laboratory of the Reichsanstalt according to the testing prescription of the Gas Referees. It was thereby found that the three consignments of pentane No. 2 conformed to the prescriptions. Description 1 had rather too high a specific gravity (0·6275 instead of 0·626); but in other respects it conformed to the specification. The deviation of specific gravity had evidently arisen from a portion of the liquid having been lost by fractional evaporation during transport in a not absolutely closed vessel. The two lamps gave on the average the same light with descriptions 1 and 2, and on the average about 1 per cent. lower with description 3 than with 1 and 2. An older lot of description 3, which had been extensively used before these comparative testings were undertaken, had given on the average the same value as descriptions 1 and 2.

It was found, on the average of 47 series of testings with pentane 1 and 2, and on the basis of the same humidity, that—

$$\frac{\text{Light of pentane lamp}}{\text{Light of Hefner lamp}} = 11.$$

The greatest deviation from the average value was 2·2 per cent., and the mean ± 1·1 per cent. The average barometric height was 759 millimetres. By Hefner "candle," the Reichsanstalt understands the light of the Hefner lamp in dry air free from carbonic acid, and containing 8·8 litres of aqueous vapour to a cubic metre of dry air.

According to measurements made by Paterson,* the light of the ten-candle pentane lamp decreases on the average by about 0·66 per cent. when the moisture increases by about 1 litre. The Reichsanstalt finds in place of 0·66 the slightly smaller figure 0·55. Earlier measurements of the Reichsanstalt had likewise given the number 0·55 for the Hefner lamp and the one-candle pentane lamp.† Consequently these three lamps are affected by the humidity of the air in the same degree within the limits of error of observation.

When the height of the barometer rises by 10 millimetres, the light of the ten-candle pentane lamp increases, according to Paterson's observations by about 0·8 per cent., and according to the Reichsanstalt's by 0·6 per cent. For the Hefner lamp and the one-candle pentane lamp, the Reichsanstalt had previously determined the corresponding factors at 0·1 per cent. and 0·4 per cent. respectively. With the ten-candle pentane lamp, therefore, the effect of atmospheric pressure is still greater than with the one-candle pentane lamp.

The light of the ten-candle pentane lamp, at 8·8 litres of aqueous vapour to 1 cubic metre of dry air, and at 760 millimetres pressure, therefore equals 11 Hefners. At the National Physical Laboratory in London, the light of the pentane lamp is regarded as normal with the average atmospheric humidity applicable to London of 10 litres of aqueous vapour to 1 cubic metre of dry air. According to the author, the light of the ten-candle pentane lamp at 10 litres aqueous vapour and 760 millimetres is equal to 10·9 Hefners.

Earlier measurements on the ratio of the light of the English candle (with the flame 45 millimetres high) gave a value of 1·14 times that of the Hefner lamp. Therefore it would have been expected that the ratio of the illuminating power of the ten-candle pentane lamp to that of the Hefner lamp would be 11·4. According to the measurements of the Reichsanstalt now reported, the

* See "Journal," Vol. LXXXII., p. 957.

* See "Journal," Vol. LXXXVII., p. 606.
† *Ibid.*, Vol. LXVII., p. 124.

illuminating power of the ten-candle pentane lamp is therefore about 4 per cent. lower than 10 old English candles. In other words, the new English candle (or pentane unit) derived from the ten-candle pentane lamp is about 4 per cent. smaller than the old one established through the spermaceti candle.

Carcel Lamp.

The carcel lamp is well known to be a simple modification of the circular-burner lamp with double air draught, constructed by Argand towards the close of the Eighteenth Century. It is fed with purified colza oil, which is pumped up to the burner from a reservoir fitted in the base of the lamp, by means of a clockwork pumping arrangement. A glass chimney having a choke is set on the stop on a ring-shaped tube which can be altered as to its height on the burner tube.

Each lamp was accompanied by a can of colza oil and a set of wicks. The fuel was used in turn in the two lamps. The lamps were so regulated about 30 minutes after lighting that the wick projected about 7 millimetres from the burner. This was in accordance with M. Laporte's practice,‡ as distinguished from the 10 millimetres which Dumas and Regnault prescribed in 1842. The choke of the chimney was 7 millimetres above the upper edge of the wick, and hence 14 millimetres above the rim of the burner. The hourly consumption of fuel generally was between 42 and 45 grammes. The photometer tests were begun about 50 minutes after lighting up. Before each testing the lamps were furnished with new well-dried wicks, and filled to the gallery with fuel. As the carcel lamp is tolerably sensitive to vitiation of the air, as Laporte has shown, the photometer-room was aired from time to time. Both lamps gave an average values for the light which agreed with one another within the limits of error of observation.

In all, 28 series of observations have been made, each of which comprised at least four directly consecutive measurements. Each such measurement included a determination of the consumption and a number of photometric settings. The consumption was deduced from the time required for the consumption of 10 grammes of oil. Several measurements were made one after the other each time, as during the testing the consumption varied up and down while the light increased comparatively little with the time.

On an average, it was found that, on the basis of equal humidity—

$$\frac{\text{Light of the carcel lamp}}{\text{Light of the Hefner lamp}} = 10{\cdot}8.$$

The greatest deviation from the mean value was 4·6 per cent., and the average ± 1·8 per cent. There is still to be taken into account that the figures from which the mean value 10·8 was deduced vary among themselves upwards of 10 per cent. The lamp, therefore, does not give exact values.

Old measurements made the ratio of the lights of the two lamps as follows:—

Dutch Photometrical Committee (1894)	10·4
Lecomte (1904)	10·5
Durand and Jigouzo (1896, published in 1898) . .	10·8
Laporte (1898)	10·9

Laporte has also compared a carcel lamp with two of the incandescent electric lamps of 10 and 16 Hefners power tested by the Reichsanstalt; and from this indirect comparison he found a ratio, on an average, of 10·8.

The measurements carried out by the Reichsanstalt with the carcel lamp are so distributed in point of time that the mean value found relates to about the average humidity in the course of a year. On drawing the mean intensities of the different series of measurements in rectangular co-ordinates as a function of the humidity, the points obtained fall within a belt of which the axis is about parallel with the abscissæ axis. It therefore follows that the dependence of the light on atmospheric humidity, so far as it can be detected with the considerable fluctuations in the light, is nearly the same as with the Hefner lamp. Assuming that in the neighbourhood of the average humidity, the relation is the same for the two lamps, it follows that the light of the carcel lamp, with a humidity of 8·8 litres of aqueous vapours to 1 cubic metre of dry air, is equal to 10·8 Hefners.

‡ *Ibid.*, Vol. LXXII., p. 807.

Mr. B. Kitt has retired from the offices of Gas Examiner and Inspector of Gas-Meters and Public Lamps to the Bristol Corporation; and at the meeting of the Town Council last Wednesday a tribute was paid to his long and efficient services. The City Engineer was appointed Inspector of Public Lamps; and the Deputy-Engineer and the City Analyst were temporarily entrusted with the duties of Inspector of Gas-Meters and Gas Examiner.

Under conditions where a weir could not be built, a novel way of measuring the flow of an artesian well has been devised, says "Iron Age." A length of 40 feet of 10-inch pipe was screwed into a 90 degree elbow on the pipe where it came out of the ground, and a hand force-pump attached to a small hole tapped into this pipe. The pump drew a red aniline liquid from a pail, and injected it into the stream, where it was carried along with the water and at the same rate. By means of a stop-watch and the known carrying capacity of the pipe, the flow of the well was easily determined.

CHANGES IN THE QUALITY OF GAS DURING ITS MANUFACTURE.

At the recent Meeting of the Société Technique du Gaz en France, a paper on the above subject was read by M. Payet, the Secretary. It was, to a certain extent, supplementary to the one on "The Influence of Gasholders on the Quality of Gas," of which a translation was given in the "Journal" last week (p. 33). In his introductory remarks, the author explained that when he was carrying out the experiments of which the results are presented in that paper, he was led to examine the variations which take place in the quality of gas during the process of carbonization. The subject had already been dealt with in a communication to the Society in 1881 by M. Ellissen, who showed its importance. His experiments were carried out with gas produced from charges of four hours, or 4 hrs. 48 min. Those of M. Payet were with four-hour charges only, alternating every two hours; and he thought it would be interesting to ascertain whether, working under these conditions, the variations noticed by M. Ellissen continued. He therefore made a series of tests during several periods, each lasting upwards of two hours, and always at the same point in the carbonization process. The gas was taken off at the inlet to the station meter, readings of which were carefully made every five minutes. From the results of his experiments, he constructed a series of curves in order to show them graphically; and these accompanied the paper.

As the gas took nearly half-an-hour to travel from the retort to the station meter, M. Payet considered only the portion of the curves representing the period between 8.30 a.m. and 10.30 a.m. An examination of the entire series, and of the data on which they were based, led the author to the following conclusions: (1) That the illuminating power of a gas varies very appreciably during the two hours separating two consecutive charges. (2) Even with the poor coal employed in the experiments (two-thirds of Lens and one-third of Bruay), and notwithstanding the high yield of gas, the illuminating power remained below 25 litres during a portion of the two hours. (3) The maximum make is attained just at the time when the gas produced is of the best quality.

The author considered that his investigations furnished a fresh confirmation of the statement often made, that for the same coal there exists a fairly constant characteristic ratio between the average lighting power and the yield of gas—both being reduced to a given pressure and temperature. It is probable that such ratio oscillates between certain limits for a given coal, and varies with the time the coal has been in store or its content of moisture. According to the author's experiments, this ratio for a lighting power of 25 litres approximates to 0·87. Assuming this number to be exact, it will be seen that a variation of 1 in the yield involves a variation in the same direction of about 0·9 litre in the illuminating power. Conclusions 2 and 3 show once again that, by adopting suitable measures at the proper times, it is possible to obtain, with any coal whatever, a gas of relatively good quality simultaneously with high yield, and without the assistance of any enriching material.

FLICKER PHOTOMETRY.

In a recent issue of the "Zeitschrift für Instrumentkunde," Dr. Hugo Krüss, of Hamburg, criticizes Bechstein's article, entitled "A New Flicker Photometer," which was published some time previously in the same periodical, and was abstracted in the "Journal" for June 5 last (p. 643).

The photometer described by Bechstein differs very little from the instrument first invented by Rood in 1899—Bechstein's revolving prismatic lens merely replacing Rood's plano-concave cylindrical lens. The flicker principle may undoubtedly be utilized in many ways for the construction of a photometer, and two forms which Krüss has already employed are shown in figs. 1 and 2, p. 104. In these, an idea suggested by Professor Brodhun has been adopted; the axis of rotation being at the same level as the optical axis of the photometer, so that the necessity for revolving the two perforated discs in opposite directions is avoided. In these instruments power is not employed, but motion is given by the hand-crank. The gearing is such that for every revolution four changes in the illumination cast by the two lights upon the field of vision take place. It should, however, be noticed that the form of flicker photometer illustrated by Bechstein as fig. 5 (*loc. cit.*) is not satisfactory, because the field is not continuously illuminated to an equal extent, inasmuch as the reflecting power of the rectangular prism passes twice through zero for every complete revolution.

The flicker principle can also easily be adapted to the Lummer-Brodhun photometer in the manner shown in fig. 3. The double Lummer-Brodhun prism R is removed; a reflecting prism r_1 is fitted to the instrument symmetrically with respect to r; and the eyepiece is focussed upon the screen P. A screen made to oscillate between the prisms and the eyepiece then brings the light reflected from the two sides of P alternately into view. The

two reflectors S_1 and S_2 may indeed be abolished by bringing the prisms r and r_1 sufficiently close to P.

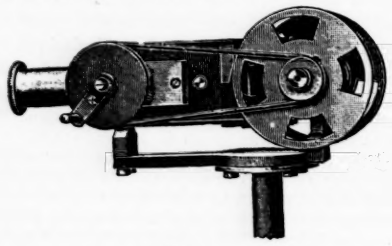


FIG. 1.

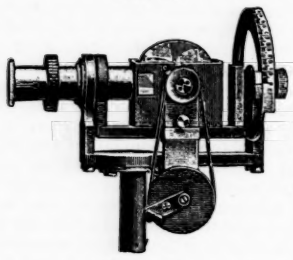


FIG. 2.

Two Forms of the Kruss Flicker Photometer.

But the employment of any of these forms of flicker photometer entirely begs the question as to whether "flicker-value" is identical with physiological illumination; for the figures as given by Bechstein, by Simmance and Abady, and by Rood before them, simply show that different observers may obtain concordant results with the flicker photometer even when the lights under examination differ in tint. As Professor Marbe has recently pointed out to the author, the attempts made by Plateau and Helmholtz to explain the facts of Talbot's law by "the duration of the stimulus" are untenable. When the eye receives a short stimulus in the dark, the impression does not persist for a time and then suddenly vanish; but, as experiments carried out by Hess prove, a regular series of impressions is established, which can be divided into at least six phases. When a constant impression is produced on the eye through the action of successive uniform stimuli interspersed by intervals of darkness, the impression is by no means a function of the stimuli alone, but of the stimuli and the intervals of obscuration. The constant impression varies in its nature according to the relationship between the durations of darkness and the durations of light; whereas endeavours to explain the phenomena according to the duration of the stimulus implicitly ignore the influence of the dark intervals.

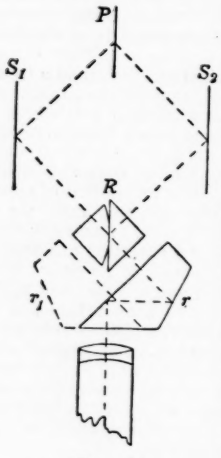


FIG. 3.

When the illumination thrown upon a revolving disc composed of black and white sectors is strengthened, two conditions are altered: (1) The difference in intensity between the black and the white stimuli; and (2) the mean intensity of the stimuli are also increased. The result is unfavourable for the production of a constant impression, because the increase of (1) exerts a more noticeable effect than the increase of (2). When the field of vision of a flicker photometer is filled alternately by the light of (*e.g.*) a Hefner lamp and an incandescent gas-burner, if the change takes place slowly, the sequence of a red colour, a faint indefinite tint, and a blue colour is easy to see. As the speed increases, it becomes ever more difficult to distinguish the colours, until the colour change disappears and only a difference in brilliancy remains. Distinction between the colours becomes impossible at a speed lower than that which produces a constant impression. Again, if diffused daylight falls upon a revolving cubical mirror, when the speed equals about two revolutions per second, various colour effects are noticed by the eye—green tints predominating; but they disappear when the speed of revolution increases to six times per second. Similar phenomena may be seen if the sky is observed through a revolving perforated disc. This may be explained by the hypothesis that the eye becomes insensitive to the colour of rays of certain wave lengths when those rays are alternately passed and obscured a certain number of times per second. Hence when the cubical mirror revolves at a certain speed, the rays of a particular wave length existing in the white light it reflects become invisible, and the rest appear coloured; while as the speed of revolution increases, the colour changes until at last all colour phenomena vanish, and the light appears grey.

Experiments on similar lines have been carried out by Benham, Liveing, Abney, and Green; and Liveing has expressed the view that light of different colours persists in the eye for a different period of time, and that the eye perceives different colours with a different degree of rapidity. It might be profitable to carry investigations into these phenomena further; for if it could be proved that after colour effects vanish so far as the eye is concerned, the two differently coloured lights enter into the flicker photometer with their natural intensities, proof that flicker-value and physiological brilliancy run parallel might be within our grasp.

DECREASE IN ILLUMINATING POWER CAUSED BY USING NAPHTHALENE WASHERS.

At the Meeting of the Rhineland and Westphalian Association of Gas, Electrical, and Water Engineers, held at Cologne last spring, some discussion took place as to the loss in illuminating power and calorific value suffered by gas during its passage through washers for the removal of naphthalene by the Bueb process. According to the "Journal für Gasbeleuchtung," after a member had submitted a series of annual works figures from his own factory which tended to show no depreciation in either respect, Dr. Barth, of the Berlin-Anhaltischen-Maschinenbau, took up the subject at some length, arguing that theoretical considerations prove that some depreciation in value, albeit a small one, must occur in the washer.

In the first place, Dr. Barth observed, the anthracene oil employed in a naphthalene washer (which yields hardly any distillate below 270° C.) is very similar to, though somewhat less volatile than, the oil (distilling at about 200° C.) which is used to remove the whole of the benzol from coke-oven gas. For the extraction of naphthalene, from 4 to 8 grammes of oil are used per cubic metre of gas; whereas in coke-oven practice from 18 to 26 grammes of benzol are recovered from 1 cubic metre with the aid of 400 to 700 grammes of oil. Extraction of benzene itself in the naphthalene washer can be prevented by first mixing the oil with 4 per cent. of benzol, when only higher homologues and naphthalene remain soluble; and proof that this treatment leaves the benzene behind can be obtained by fractionally distilling the oil when new and when fouled.

The total volume of heavy hydrocarbons in gas is 35 to 45 litres per cubic metre, and their weight about 80 grammes. Of this quantity, the vaporized liquids amount to 30 or 40 grammes. Per cubic metre, about 1 gramme of naphthalene and not much more than 1 gramme of liquid hydrocarbons are extracted by the oil; so that the loss in calorific value is roughly 20 calories (the heat of combustion of naphthalene is 9·7 calories per gramme)—*i.e.*, in a gas having a calorific value of 4700 to 5200 calories per cubic metre [130 to 150 calories per foot] is about 0·4 per cent. Now, successive tests of the same gas in the calorimeter often differ by 20 or 30 calories per cubic metre; so that the magnitude of the loss in calorific power occurring in the naphthalene washer lies within the limits of experimental error. A difference of 1° C. in the temperature of the gas tested so affects its volume that the observed calorific power varies by about 0·37 per cent. Moreover, the determination of calorific power is always carried out upon the same volume of gas; whereas an allowance ought to be made for the decrease in volume caused by the removal of naphthalene, &c., in the washer. Again, it must be remembered that the varying quality of the gas—due to variations in the coal, in the amount of air introduced, in the conditions obtaining in the retorts, in the extent of condensation brought about by changes in atmospheric temperature, &c.—are still more serious, and frequently lead to differences of 200 to 300 calories per cubic metre in the observed calorific power. Hence it is not possible for the works figures to indicate the loss in calorific power which occurs in the naphthalene washer; and the same remark applies to loss in illuminating power.

Since the illuminating power of gas consumed in a flat-flame or argand burner depends mainly on the heavy hydrocarbons present, the loss of 2 or 3 grammes out of a total of 80 per cubic metre corresponds with a loss in light of 2 or 3 per cent.—*i.e.*, of 0·3 to 0·5 candle power in a gas of 15 to 18 candle power. Such a loss should be clearly noticeable; but the subjective nature of photometry, and the variation from time to time (as above described) in the illuminating power of the gas, tend to mask it. The liquid hydrocarbons retained, together with the naphthalene, in the washer have high boiling points; and they are probably identical with the oily part of the matter which collects in the syphon boxes of the distributing system. Hence the adoption of a naphthalene washer scarcely affects the consumers, for the substances which are taken out of the gas by the washer would in all likelihood (in its absence) condense out of the gas before ever it reached their premises.

British Association of Water-Works Engineers.—We are asked by the Secretary (Mr. Percy Griffith) to announce that the reception by the Mayor and Mayoress of Scarborough next Thursday, on the occasion of the opening of the annual meeting of the Association, will not take place at the Town Hall, as previously arranged, but at the Cayton Bay pumping-station, and somewhat earlier than was originally fixed.

THE CAPACITY OF WATER-GAS SETS.

By Rollin Norris, of Philadelphia.

[A Paper read at the Meeting of the Western Gas Association.]

In preparing these notes on the capacity of water-gas sets, I have assumed that the apparatus under consideration is of the ordinary Lowe type, where the blast products heat checker-work for the fixing of oil vapours during the subsequent run.

High capacity is a virtue in a set, where it can be obtained without a corresponding sacrifice of other efficiencies; and there may frequently arise emergency conditions, where, even at the sacrifice of some efficiency, it is desirable to be able temporarily to run up the capacity of a set. Ignoring for the moment the limiting effect of the capacity of fixing-vessels for handling oil, let us first consider the general principles underlying the action of the generator, and see in what particular direction modification of methods tends to increase capacity. In such a discussion, it will be necessary to mention a number of things which are elementary, and, in a sense, self-evident.

The making of blue water gas in a generator divides itself into two stages: (1) The blow, during which the heat is stored in the fire; and (2) the run, during which the heat is abstracted from the fire by the decomposition of steam. Each step takes time; and to increase the capacity of a set, the rate of storing heat during a blow, or the rate of abstracting heat during a run, or both, must be increased.

With a set in proper balance, the amount of heat stored per minute of blow varies approximately with the amount of coal burned per minute of blow; and this in turn varies approximately with the amount of air forced through the fire per minute. In other words, increased capacity depends upon increased volume of air; and until other limiting conditions are reached, the more air that is passed through the fire per minute, the greater the capacity of the set.

The rate at which air passes through a given fire depends not upon the pressure under the grate, but upon the difference in the pressures above and below the fire and the mechanical condition of the fuel-bed; and the amount of air passing through the fire per minute may be increased by raising the pressure under the fire, or decreasing it above the fire, or by decreasing the internal resistance of the fire-bed itself.

Increasing the pressure under the grate costs money in the form of increased boiler fuel to maintain the extra blast pressure; and consequently the most economical way of increasing the blast head, or the difference between the pressure under the fire and that on top of the fire, is to lower the pressure on top of the fire by reducing as much as possible the resistance from the top of the fire to and through the stack-valve.

The pressure on top of the fire is made up of the following resistances: Loss in passing through connections between shells; loss in passing through the stack-valve; and loss in passing through the checker-work itself. The resistance of the connections between the shells and the resistance of the stack-valve are not useful, and should be reduced to a reasonable amount by making these openings large—the only limit being a structural one. But the resistance of the checker-work is a necessary evil, and cannot be reduced below a certain (or uncertain) amount without unduly sacrificing the efficiency of the checker-work as a fixing agent.

As an illustration of the effect on capacity of decreasing the resistance beyond the fire, I might just mention the case of a 7 ft. 6 in. set with a fire 5 ft. 6 in. in diameter. About fifteen years ago, these 7 ft. 6 in. sets had a capacity of somewhere about 350,000 cubic feet per day, and an investigation of the blast conditions showed a resistance of about 6 inches under the stack-valve, which at that time was made only 8 inches in diameter. The connections between the shells were also very small, with the result that although we carried about 18 inches of blast pressure under the grate, the blast head was very low, and the amount of air passing through the generator per minute was low, with a corresponding small rate of make.

These sets now have very much larger connections between the shells; and the stack-valve is 18 inches in diameter instead of 8 inches as formerly. This set now makes, with no increase in pressure under the grate, upwards of 700,000 cubic feet per day, or more than twice as much as it formerly did.

One of the conditions of high capacity may therefore be summed up in the expression "more wind." But the rapid abstraction of heat during the subsequent run must also be considered, as, when a set is running in proper balance, the heat abstracted from the fire during the run is equal to the amount of heat stored in the fire during the blow; and it is evident that increased blast must be accompanied by a corresponding increase in the rate of steam admission, or in the proportion of steam decomposed, or in the length of time devoted to the run. As increasing the length of the run and maintaining the old small supply of steam to the generators is a waste of time, and therefore of capacity, the size of the steam connections to the generators has been largely increased, corresponding to the increased supply of air.

But there is another element of which sight must not be lost. The actual steam decomposed in making 1000 cubic feet of carburetted water gas is about 15 lbs., whereas the amount of steam introduced into the generator is about 30 lbs. per 1000 cubic feet, or about double the amount decomposed. With a fire of a given temperature, there seems to be a limit to the rate at which it will decompose steam; and after a certain point is reached, any higher rate of steam admission is not followed by any largely increased rate of make. Beyond this point, flooding the fire with steam simply reduces efficiencies, due to the cooling off of the fire in heating up the excess steam passing through it. But it appears that the hotter the fire is the greater the quantity of steam it can decompose per minute; and consequently, for the maximum rate of heat-absorption during the run, the fire should be as hot as practicable at the beginning of the run, and this should be cut off before the fire cools down to such a point that the rate of steam decomposition has materially decreased.

The conditions, therefore, making for a high capacity during the run are a sufficient supply of steam, a high temperature of fire, and a short run. Stopping the run while the fire is still hot means that at the beginning of the blow the temperature of the fire is high, and the blow must be correspondingly short in order to avoid excessive fire temperature and a serious formation of clinker. This not only cuts the capacity of the set by increasing the time required for cleaning (thus reducing the effective working hours of the apparatus), but has a still more serious effect on the capacity by increasing the resistance of the fuel-bed to the passage of the blast, with a corresponding reduction in the quantity of air passing through the fire per minute of blow.

As explained above, high capacity requires a high fuel-bed head; but a high fuel-bed head may be caused not only by a high initial blast, or by low resistances after the fire, but by excessive resistances in the fire itself. It is therefore necessary to steer between two limits. The clinker must be kept down by avoiding excessively high temperatures at the end of the blow, and the run must be stopped while the fire is still fairly hot. These conditions, therefore, limit the range in temperature between the beginning and end of the blow, and a determination of the most economical working conditions has to be fixed by actual trial.

The time consumed in changing valves, in putting fuel into the generator, and in cleaning the fire, reduces the actual working hours of the set by the time thus occupied; and it follows, therefore, that the mechanical arrangement of the set should be such as to allow these operations to be accomplished with a minimum expenditure of time. An inconvenient arrangement of clinkering-doors, or an improper adjustment of blast and steam conditions, causing undue formation of hard clinker, may easily run up the clinkering time an extra half hour twice a day, which would be equivalent to the loss of an hour's actual running, or nearly 5 per cent. decreased capacity.

In summing up the foregoing, we have the following as conditions of high capacity: (1) Rapid rate of passage of air through the generator during the blow, this being accomplished by high pressure under and low pressure on top of the fire, and a fuel-bed resistance which is kept as low as practicable. (2) The avoidance of excessively high temperature at the end of the blow, which would cause clinker, and increase the internal resistance of the fuel-bed to the passage of the blast. (3) High temperature of the fire at the end of the run, so as to stop the run before the rate of make has unduly decreased. (4) Conditions Nos. 2 and 3 call for a short blow and a short run. (5) A sufficient supply of steam during the run. (6) A good clean fire, offering as little resistance as possible to the passage of the blast. (7) Proper mechanical arrangements for making the valve changes and cleaning the fires with a minimum loss of time.

In the foregoing notes, I have considered principally the conditions making for the maximum capacity of the generator for producing blue gas, but have alluded incidentally to the limiting effect of the capacity of the fixing-vessels for handling oil. A set of these vessels, filled in any given way, has some particular distribution of heats at which it will fix with maximum efficiency a certain amount of oil per minute. Any marked increase or decrease in the amount of oil introduced per minute will call for a corresponding increase or decrease in the temperature of the vessels, with, at the same time, a falling off in oil efficiencies.

It takes time for the bricks to absorb heat from the gases burning around them; and where the generator conditions are modified so as to increase the amount of blue gas made per minute, with a corresponding increase in the oil to be fixed during the run, it called for increased temperature in the fixing-vessels, as already explained. This must be obtained either by increasing that of the gas burning around the bricks during the blow, or the time devoted to heating the bricks. As the temperature of the burning gases cannot readily be raised, it follows that higher carburettor heats mean normally a longer blow, which often results in the fire reaching the desired temperature before the fixing vessels are properly heated. This results in waste of time, tending not only to reduce the generator fuel efficiencies, but also to cut down the capacity of the set by unduly prolonging the blow. Winter, when the oil per 1000 cubic feet required to deliver gas of the standard candle power to the consumer is the highest, is also the time when high capacity is usually the most useful; but to maintain efficient oil results, the daily capacity of the set must be correspondingly reduced, so as not to overwork the fixing-vessels.

As our sets are now constructed, therefore, it would appear that the limit of capacity lies rather in the requirements for economically fixing the oil than in limitations of the capacity of the generator itself. It is just possible that some modification in

our methods might be made which would enable the combustion of the blast-gases in the fixing-vessels during the blow to be concentrated at the points needed, thus enabling us to get the required temperature more rapidly; or some change in the dimensions or material of the checker-bricks themselves might be effected which would enable them to absorb heat and give it off more rapidly than with the present construction. The large proportion of the cost of oil per 1000 cubic feet to the total cost of the gas makes the question of oil efficiencies one of supreme importance; and it would require a very large increase in capacity to justify any considerable accompanying reduction in oil efficiencies.

It follows from the foregoing that the maximum capacity of a Lowe set is obtainable when making gas of comparatively low candle power, as, under such circumstances, the apparatus can be worked more nearly up to the capacity of the generators. The extent to which a set is pushed for capacity also materially affects the generator fuel per 1000 cubic feet; and, as a general proposition, my own experience would indicate that the net economical capacity of a water-gas apparatus of standard construction is approximately 10 per cent. below its maximum capacity.

OIL-GAS TAR FOR IMPROVING ROAD SURFACES.

In view of the revived interest in the subject of the use of tar for improving road surfaces resulting from the remarks of Sir George Livesey at the recent meeting of the Institution of Gas Engineers, we reproduce an article which appeared in "the Surveyor and Municipal and County Engineer" for the 29th ult.

OIL-GAS TAR FOR DUST PREVENTION.

During the early part of May, 1905, some practical tests were carried out at Tunbridge Wells by Mr. W. H. Maxwell, the Borough and Water-Works Engineer, in the use of what may be described as "oil gas tar" for the treatment of about 10,000 square yards of main roadway surfaces carrying a very considerable traffic, including a large proportion of fast motor and traction-engine traffic. As many inquiries on this subject have been made by surveyors, motorists, and others travelling over these treated surfaces, and as we are not aware of this particular liquid having been previously employed for this purpose at the date of these experiments, a few particulars of the trials then carried out will doubtless be of general interest.

In many gas-works at the present time coal gas is enriched by the manufacture of carburetted water gas. The water gas is first generated and afterwards carburetted by being passed through chambers in which oils are decomposed by heat. From this use of oil in the manufacture of carburetted water gas, there results a residual liquid described above as "oil-gas tar," for the purpose of distinction from ordinary coal-gas tar, which has been frequently used for the painting of road surfaces and tar macadam footways. It was found, by practical test, that this residual liquid possessed certain very useful properties which rendered it specially serviceable for the preservation of macadam and other roadway and footway surfaces, and for the prevention of the formation of dust and the penetration of wet into the crust of the road.

The mode of application of the liquid in the Tunbridge Wells tests of May, 1905, was: (1) The preliminary making good of the roadway surfaces; (2) the thorough sweeping off of all loose dust and horse droppings; (3) the preparation and heating of the oil-gas tar at the site in a suitable 50-gallon cauldron; (4) the application of the liquid, in its hottest condition, to the well-cleaned road surface by means of hand water-cans with coarse rose or spreader, or from a small hand water-cart, which is preferable to the use of an ordinary horse water-cart, as the smaller bulk of liquid facilitates its application in the hottest condition, and hand distribution is found more flexible in working with the traffic, which need not be stopped; and (5) the brushing of the liquid into the surface with fairly stiff-haired tar-brushes. The mode of application was, in fact, very similar to that frequently practised before in the application of ordinary coal tar. The process or number of coatings was repeated until the pores of the roadway surface showed signs of being well filled, and a close asphalte-like face presented itself.

The advantages of the treatment experienced were: (1) The oil-gas tar could be applied to the road without stopping the traffic, and the liquid sank rapidly into the road crust, so that vehicles were able to pass over the site without inconvenience almost immediately. (2) There was no tendency to "lick up" at any time, either when freshly put down or after rain. The closing of the road, diversion of traffic, licking up, and working into ridges caused by the traffic (especially after rain), are important practical disadvantages in the use of ordinary gas tar not present in the case of the oil-gas tar as used at Tunbridge Wells. (3) The application can be much more expeditiously done than is the case with coal-gas tar; and the cost was found to be very much less, owing to the lower price of the oil-gas tar and reduction of labour in its application. The first coat, including preparation and sweeping of the roadway surface, cost, we are informed, about ½d. per square yard; while each succeeding coat cost less, owing to the greater area covered per hour and per gallon of liquid. (4) The surface was not adversely affected by rain; and the treatment remained in good condition from May till the end of October on surfaces lying fairly level, and much longer on roads having a small incline sufficient to keep them well drained. (5) The protective asphalte-like skin which quickly formed under the run of traffic over the surface of the road effectually prevented dust, and materially reduced wear and attrition of the road-metalling surfaces; the oil-gas tar being found to penetrate about 5 inches into the crust of the road. (6) No "watering" was necessary; and scavenging, other than the picking up of horse droppings, was very materially reduced. (7) No fine grit or sand was sprinkled over the newly-treated surface; and the traffic at once passed over without inconvenience. In the case of ordinary coal tar, a coating of fine grit is essential to prevent licking up, and the road must be kept closed for a day or two. The grit so added is of itself a source of a great amount of "dust" on windy days, and it is therefore a considerable advantage to be able entirely to abandon its use.

Road surfaces so treated should, of course, be put into good repair before the application of the liquid, as subsequent repair with ordinary metalling and water slurry is not so conveniently done until the effect of the oily nature of the tar has passed off. Other experiments were also made, upon adjoining road surfaces, in the use of ordinary coal-gas tar in various ways, and the result of these practical trials proved that oil-gas tar—a bye-product of gas manufacture for which no considerable market at present exists—is a very suitable liquid for dust prevention over large areas of roadway too extensive to be dealt with in the more permanent, and necessarily more costly, method of laying good iron-slag tar macadam. This liquid may also be advantageously used upon thoroughfares in the central parts of a town, without the well-known disadvantages attendant upon the use of coal-gas tar in such situations, and will involve no inconvenience to the public, either in its application or subsequent wear. Oil-gas tar, in fact, as proved by the experiments at Tunbridge Wells, appears to be probably the most effective, economical, and most expeditiously applied dust-preventive treatment yet utilized in a practical way over large areas.

SPONTANEOUS OXIDATION OF COAL.

As already briefly mentioned in the "JOURNAL" (*ante*, p. 308), a paper was read a short time ago by Herr Habermann before the Baltic Association of Gas and Water Engineers upon the spontaneous oxidation of coal. Since that date, his communication has been printed at length in the "Journal für Gasbeleuchtung;" so that the following additional particulars have become available for publication.

The experiments carried out by the author upon the spontaneous oxidation of coal when exposed to a somewhat elevated initial temperature were performed in one of the retorts of a bed which was standing idle, but was constantly receiving heat from the contiguous beds, where gas was being made in the usual way. Preliminary experiments showed that the heat of the retort employed could be easily maintained at a temperature of 142° C., with a variation not exceeding 2° C., during the space of a week. The retort was fitted with two inlet-pipes for air, 1¼ inches in diameter, brought almost to the floor of the retort, and also with some other tubes, closed at their internal extremities, placed about half-way up in the retort, and serving for the measurement of the temperature. The mouth of the retort was bricked up and made tight round the pipes. The cover of the ascension pipe was removed; the size of the aperture left being made adjustable, so that the volume of air passing through the apparatus might be under control. The coals tested were sampled with the shovel immediately after arrival, passed through the breaker, and carefully screened till only ¼-inch lumps were left. The samples were put aside for 36 hours, being frequently turned over during the time, and finally a weight of 4 cwt. was charged into the retort, spread out, and levelled with a gauge, in such fashion that the thermometer tubes were covered, and the air escaping from the mouths of the inlet pipes had always the same height and quantity of coal to pass through.

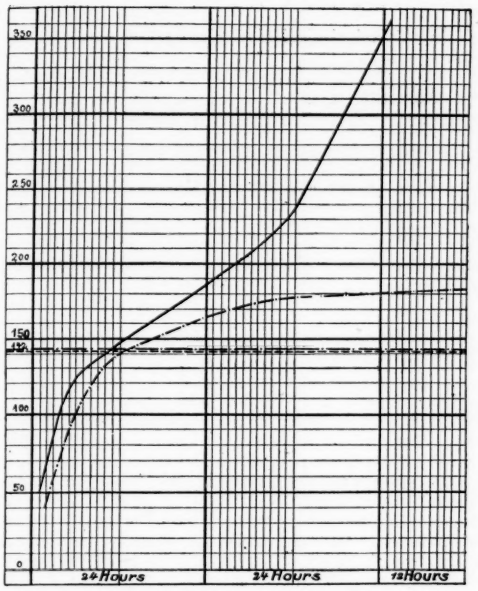
Two different coals were tried—the first a Leverson's Wallsend containing 5 per cent. of ash and 1·2 per cent. of water in its air-dried state; the second an anthracite-like coal known as "Bighwine," containing 3·8 per cent. of ash and 1·5 per cent. of water under similar conditions. The temperature of the air entering the retort varied from 24° to 26° C.; and its effect, *plus* that of the cold coal, was to reduce the original temperature of the retort itself to 50° or 40° C. Soon afterwards, the temperature rose again to its initial height, continuing to increase until, when the Wallsend coal was being examined, it reached 250° C. in 36 to 39 hours, and 300° or 350° C. in 10 or 12 hours more. In exactly similar circumstances, the "Bighwine" coal gave a temperature of 175° to 180° C. in 36 to 39 hours—a temperature which only rose slightly on more prolonged treatment. The results of the two experiments are shown graphically in the diagram next page, where the ordinates are Centigrade degrees, and the abscissæ are hours—an interval of 24 hours lying between each thick vertical line. The dotted horizontal line indicates the temperature at which the retort was kept by the heat naturally transmitted to it from the neighbouring brickwork.

In Engler and Weisbach's opinion, powdered coal absorbs oxygen, and the gas becomes combined with it mainly in the form of peroxide. Richter has shown by laboratory experiments that, when coal has absorbed oxygen, the gas cannot be recovered as such either by evacuation or by heating. If the coal is gently ignited, or if it is merely boiled with water, not oxygen, but carbon dioxide is given off. Habermann has attempted to ascertain whether any peroxide is formed by treating coal with an aqueous solution of hydrogen peroxide. But in spite of numerous modifications in the experimental conditions, he has not been able to detect the presence of any peroxide, either with the chromic acid and ether or with the titanic acid tests.

BROMINE ABSORPTION.

It seems possible that the manner in which coal tends to oxidize spontaneously in the air, the energy with which it absorbs oxygen, and the extent or rapidity with which it takes up bromine,

may be so interconnected that, under rigidly prescribed conditions, its bromine absorption may be employed as a measure of its liability to spontaneous oxidation during storage. When tested for its bromine absorption with a semi-normal solution, the Wallsend coal mentioned above took up an amount equal to about 800 milligrammes of bromine per gramme—*i.e.*, had a "bromine value" of 800; whereas the Bighwine coal, which did not attain so high a temperature in the warm retort, only gave a bromine value of 400 to 600. Parallel tests with other coal samples gave the following results: Hohenzollern, 400; Konkordia, 600-800; Radzionkau, 400-480; Gräfin Laura mine (Königshütte), about 400; Brandenburg, about 400; Gotthardt, about 800; Karoline, about 600; and Kersten Zentrum, about 400-480.



Curves showing Spontaneous Oxidation of Coal when kept at a Constant Temperature of 140° to 142° C.

In the course of his introductory remarks, Habermann observes that when coal oxidizes spontaneously at or below 150° C., products having a bitumen-like odour are produced, which are characteristic of a coal-store where faulty construction has permitted the mass to heat. If the products are recovered in a well-cooled condenser, among those soluble in water, "so-called aldehydes" may be detected by the formation of a mirror in a tube containing an ammoniacal solution of silver.

It is worth noticing that vapours of acetaldehyde interfere with respiration; and possibly, therefore, the well-known evil effects experienced by men when working in badly-ventilated, hot coal-stores, may be partially determined by the presence of such vapours in the air.

THE LARGEST WATER-MAIN IN THE WORLD.

A few months ago, the King of Spain assisted at the trials of the Sosa Canal at Monzon, in the Province of Huesca, which is probably the largest water-main hitherto laid. According to some particulars recently given in "La Nature," it is a syphon 1110 yards long, formed of two parallel pipes. Their interior diameter is 12 ft. 6 in., and the head of water 92 feet. These pipes are estimated for a delivery of 7700 gallons per second, which is the quantity required for the Aragon and Catalonia Canal. A point deserving of note is that these gigantic pipes are made of armoured cement. It was a question of running the canal through the valleys of Sosa and Ribabona to irrigate about 261,820 acres of barren land. The Government engineers studied several solutions of the problem; but the cost of an aqueduct led to the adoption of a colossal syphon. Competitive schemes were invited, including those in which iron and cement were utilized. This system was adopted for economic reasons; and the work was entrusted to Don José Eugenio Ribera, who designed and constructed of armoured cement the magnificent bridge of Maria-Christina at San Sebastian. The work was carried on with wonderful rapidity. The first sections were completed in July last year, and the syphon was finished in November. The official tests, under full pressure, were made with perfect success on the 2nd of March, in the presence of the King and the Minister of Public Works. Spain now, it seems, holds the record in this class of work. The largest mains previously constructed were those of Champs and Romanche (Isère), the diameter of which does not exceed 11 feet; while the length and pressure are much less than in the case of the Sosa syphon.

RAUPP'S GAS CALORIMETER.

At the last Meeting of the Middle Rhenish Association of Gas and Water Engineers, a paper (afterwards printed in the "Journal für Gasbeleuchtung") was read by Herr F. Lux describing a new form of gas calorimeter for comparative experiments devised by Herr H. Raupp, of Mainz.

The principle of the apparatus depends on the fact that if heat is communicated to a certain spot in a solid body, a certain interval of time elapses before the temperature of a second spot, previously determined upon, at some distance from the first, rises by a known amount; the time occupied in the rise being the shorter as the difference in temperature between the two spots is the greater. The apparatus itself consists of a vertically supported cylinder of copper, hollow at its lower part and solid above. The hollow part is a combustion chamber, into which the flame of a bunsen burner plays. Immediately below the top of the hollow chamber, the cylinder is provided with numerous holes drilled in its walls; the combustion products escaping through them. Just above these holes a deflector is fitted to protect the thermometer from the heat contained in the combustion products. The deflector is a conical ring pointing upwards, attached to the main cylinder, and composed of two thicknesses of metal with an insulating layer between them. A central hole is drilled in the solid upper part of the cylinder, and into it is fixed a delicate thermometer graduated into tenths of a degree centigrade. A glass cylinder, resembling a lamp chimney, surrounds the thermometer, as an additional safeguard against heat issuing from the combustion products. By this system of construction, the thermometer is affected solely by the heat conducted through the body of the copper from the top and sides of the combustion chamber. The support which carries the cylinder also carries an adjustable bunsen, which can be swung and clamped centrally beneath the combustion chamber, or revolved to the other side of the upright. In the latter position, its flame rises between two horizontal sighting wires, which serve for adjusting the height of the flame.

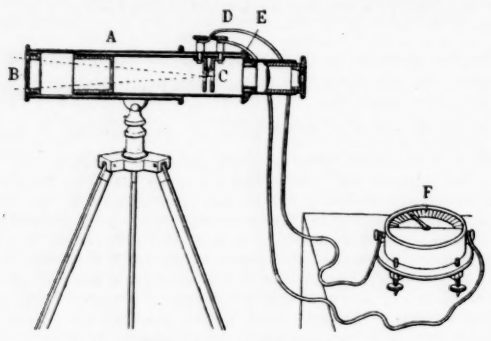
When a test is to be performed, the bunsen is supplied with gas, at a constant rate, through a delicate governor, &c.; the burner being raised or lowered till the tip of the flame coincides in height with the sighting wires. The temperature of the thermometer is read exactly; and then the burner is swung round underneath the cylinder at the same moment that a chronograph is started. When the thermometer has risen through a distance of 10 degrees, the chronograph is stopped, and the time spent is noted. The flame and cylinder should be of such size that the time is between 6 and 12 minutes. The apparatus is first of all calibrated by burning under it, in the same fashion, hydrogen, carbon monoxide, methane, and, if desirable, mixed gases whose calorific powers have been determined in a Junkers calorimeter. From the results so obtained, a table is prepared which shows at a glance the calorific power of any test gas in terms of the number of seconds occupied by the thermometer in rising 10° C.

In comparison with the Junkers calorimeter, Raupp's instrument has the advantages of being much cheaper and simpler to work, of requiring no water supply, of involving no calculations, and of being more rapid in action. On the other hand, it only gives comparative results, cannot be employed for consecutive experiments without some interval between (for cooling), and is less accurate than the Junkers apparatus. The chief value of the Raupp calorimeter would appear to lie in its suitability for use on a gas-works where one or two daily estimations of calorific power are needed, with the object of ascertaining the average heating value of the gas supplied over long intervals.

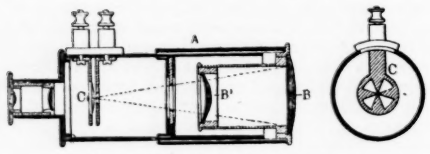
FÉRY'S OPTICAL RADIATION PYROMETER.

A recent issue of "Stahl und Eisen" contains a description of M. Féry's optical radiation pyrometer as modified to render it more suitable than hitherto for measurements of high temperatures outside the laboratory.

The apparatus, it will be remembered, is based on Stéfan's law that the radiant energy of a perfectly black body is equal to the fourth power of its absolute temperature; whence it follows that the readings of the instrument become constantly more delicate as the temperature of the source of heat rises. In its general form, the pyrometer resembles a telescope with one sliding joint. The outer tube carries the objective, which, for laboratory purposes, is a single plano-convex lens of fluorspar, but for factory work consists of a pair of lenses; the outer one being plano-convex, and the internal one concavo-convex. The lenses are supported at a fixed distance apart, and chosen so as to possess but little power of absorption. The inner sliding tube carries a double eyepiece, the disc of blackened silver upon which the heat rays fall, and a stop which causes the rays to impinge upon the disc at a constant angle however much the telescope may be lengthened or shortened to focus rays coming from different distances. A cross-shaped screen protects the wires of the thermo-couple from the heat, but leaves the silver disc exposed. One



Pyrometer for Laboratory Use.



Pyrometer for Factory Work.

A. Telescope. B. Convex and Concave Lenses. C. Thermo-Couple. D E. Wires to Thermo-Couple. F. Galvanometer.

joint of the thermo-couple lies at the centre of the disc, the other is placed outside the cone of rays. Two binding screws are fixed close to the disc, outside the sliding tube, from which wires lead to the galvanometer. The pyrometer is graduated by comparing the deflections of the galvanometer needle against those of a standard instrument, which, in its turn, is standardized against a Le Chatelier couple. Experiments show that there is no loss of heat caused by keeping the pyrometer at a considerable distance from the radiant; the temperature of a mass of molten iron was represented to be exactly 1200° C., whether the instrument was 3 feet or 54 feet distant. It may be objected that the substance radiating heat is not a "perfectly black" body; but it is found that most subtances at a red heat, especially iron and steel, and the interior of a furnace exposed only through a small sight-hole, are so nearly "perfectly black" that Stéfan's law applies, and Féry's pyrometer accordingly gives trustworthy readings.

PROTECTION OF SERVICE-PIPES.

At the last Meeting of the Ohio Gaslight Association, a paper on the above subject was read by Mr. R. C. Congdon, the Assistant-Superintendent of the Atalanta (Ga.) Gas Company.

At the outset, the author said he should not attempt a theoretical discussion of the subject of the corrosion of iron and steel, but merely refer to such authorities and give such particulars as he thought would be of general interest; for to understand theoretically how to protect service-pipes would require not only a knowledge of electricity and the metallurgy of iron and steel, but also of the chemistry of the soil, which was closely related to geology and bacteriology. He then gave the following quotation on the subject of corrosion from "The Metallurgy of Steel," by Mr. H. Marion Howe, M.A., B.Sc.

The readiness with which iron oxidizes, familiar to all through its exasperating proneness to rust, deemed a token and penalty for the blood it has shed, in general increases with its heterogeneousness, with the fineness of its subdivision, and with the temperature. It is affected by contact with substances of different potential—zinc and highly zinciferous brasses retarding, but bronzes, copper, tin, lead, and iron scale hastening, corrosion. While it is doubtless affected by the metal's composition, we have as yet little information as to what compositions favour and what oppose corrosion. Skin bearing cast iron resists corrosion better than wrought iron and steel, and the hard-grained cast irons better than the soft and more open ones. If its skin be removed, however, cast iron cannot yet be said to resist corrosion better than malleable iron, nor can we say which class of malleable iron resists corrosion the best. Soft steel plates are thought to retain the scale more tenaciously than wrought iron, which hastens their corrosion. If this be removed, there is probably no important difference in the rate at which they corrode. Individual peculiarities of the specimens experimented on, and slight differences in conditions, affect to an astonishing degree the rapidity of corrosion. This necessitates extreme caution in drawing inferences from even direct tests. Accurate conclusions can only be drawn from the averages of many determinations. Moreover, the relative corrosion of two classes of iron under one set of conditions gives no safe indication as to what it will be under another set. The chief ulterior sources of oxidation of iron are atmospheric oxygen (free or dissolved in water), its own oxides, and more rarely water.

Mr. Congdon said he thought it had been generally conceded that the acids and salts in solution, as well as oxygen and water, covered the range of chemicals against the action of which it was necessary to protect gas-pipes. He then proceeded as follows: The elements found most abundantly in the soils are divided into two classes: Acid-forming elements, such as oxygen, silicon, phosphorus, sulphur, chlorine, nitrogen, and hydrogen; and base-forming elements, such as aluminum, potassium, sodium, calcium, magnesium, and iron. The following analysis of soil was taken from a city street, 3 feet from the surface, the ground being exposed to all changes of the weather, and given in a paper by Mr. S. M. Kinter on "Alternating Current Electrolysis." This is the soil in which he buried his wrought-iron pipe:

Water	20·430	
Silica	54·264	
Alumina	21·061	in clay ground.
Iron oxide	2·692	
Lime	0·532	combined, not as carbonate.
Calcium chloride	0·755	(0·49 p. ct. chloride.)
Free hydrochloric acid	0·022	
Alkali as K_2O	0·210	combined as clay.
Organic matter	0·056	

For our purposes, soils may be classified according to their colour, size, form, and arrangement of solid particles, as clay, loam, sand, gravel, ash, &c. Organic matter or humus imparts colour to soils; those containing large amounts being dark. Decaying organic and mineral matter produces brown or black compounds. The red colour is said to be due to the presence of ferric oxide, the yellow to smaller amounts of the same material. In some of these soils, iron or steel pipe having no protecting coating would corrode very rapidly, while in others it might last a long time. We all know that even coated pipe laid in ashes or other refuse will decay very rapidly, while uncoated pipe embedded in clay may last for years; and so it becomes necessary, when adopting any particular coating, to know to what extent the chosen coating will last in these soils.

Assuming that we all agree that it is a good practice to coat service-pipe before covering it in the ground, how can we know what is the best method of protection against rust (in the ordinary sense) and electrolysis? A number of substances have been proposed as suitable for coating, among which may be mentioned asphalte and paints having a tar base, galvanized and tin coating, and the coating of black oxide of iron formed on the pipe by heating it in an oven in the presence of oxygen. There are paints having for their pigment carbon, graphite, red lead, white lead, &c.; and there are many commercial paints sold under high-sounding names. Pamphlets setting forth the wonderful results in practice of compounds marvellous in their hidden secrets are often presented in very attractive shape, and show pictures of many iron and steel structures painted with the mixtures thus advertised for sale. We read and are impressed, and perhaps are tempted to use the paint on a large scale. Then the thought comes to us: When can we have demonstrated that this paint is a serviceable one for our needs? And when we remember that a thorough test requires a subjection of the paint to the action of the earth's chemicals for a period of fifteen or twenty years, we wonder if this subject has not been presented before. The service being as old as the industry, surely some far-sighted one, possessing knowledge, patience, and faith, must have started an investigation years long gone by. We turn to literature, and fortunately for us, through the inauguration of the Gas Association, we read in the published proceedings that this important subject has not been passed unnoticed, but that the matter had received detailed investigation long before many of us even thought of taking up gas engineering as our life's work.

I have no new service coating to bring to your notice; but I can add the testimony of our Company to the efficiency of a compound so familiar to us all—that preparation which was the result of painstaking investigation by the late General Hickenlooper, the first President and distinguished honorary member of the Ohio Association. Ten years ago, Mr. A. C. Humphreys, through the courtesy of General Hickenlooper, gave to the gas fraternity at large the specifications for making this coating. At that time the compound had been in use in Cincinnati for ten years, and I think the consensus of opinion to-day is in favour of this mixture.

A good thing bears repeating. The following are the specifications as given by Mr. Humphreys in his paper entitled "Coating Service-Pipes," and published in the Transactions of the American Gaslight Association for 1896: *

Bring a kettle of tar (20 gallons) to a low boiling-point, and add 20 lbs. of fresh slack lime sifted over the top and worked down. Boil down to a paste or a consistency about midway between tar and pitch. Let it settle for a few minutes, then add 4 lbs. of tallow and 1 lb. of powdered rosin. Stir until they are thoroughly dissolved and incorporated with the tar. Then let it cool and settle. Ladle off into barrels. When ready for use, to each barrel of 45 gallons of the above mixture add 4 lbs. of crude rubber dissolved in turpentine to the consistency of thick cream. Heat the mixture to about 100° Fahr., and immerse the service-pipe heated to about the same temperature.

Apart from the external deterioration of the service-pipe, the inside condition may become a factor in its life. Especially is this true for sizes of 1 inch and under. This truth I have had demonstrated to me. A few years ago, I had some interesting and valuable experience in a small town, where the soil was light clay and bed rock. The streets were paved with cobble stones, and there was no underground sewerage system. After my

* See "Journal," Vol. LXVIII., p. 1233.

arrival, I soon experienced considerable trouble. Among other things, I learned that service-pipes could give trouble from the inside as well as from without. On Mondays, the gutters were blue if the sky was not; and many times did I catch children striking matches at them to light the "spirit . . . that did burn like oyle." It was with pipe under the gutters that I experienced the greatest trouble. The character of the paving allowed much water to ooze through, which had a most damaging effect upon the iron. Many services were removed which were so corroded that one could easily puncture them with the finger; and I might add that it was one of these defective services which let in volumes of water after a thaw, and which during the night overflowed the drip-box on the only feed line from the works, and nearly cut off the supply. A great many small services were removed, not on account of external corrosion, but because the administered alcohol, the blast from the service-pump, and the twist of the rod failed to make an opening. This accumulation on the inside of the services I attributed to the fact that air-slaked lime had been used as a purifying agent, and the scrubbers for many years had been out of commission. In other words, the gas had not been purified.

The prevention of this inside accumulation is, in my opinion, worthy of more care and study than is often given. I was much interested in a paper by Mr. Paul Doty, entitled "Report on Burner Stoppages," and one by Mr. F. B. Wheeler, on "Rust Deposits in House Pipes," published in the Transactions of the American Gaslight Association for 1897.* The latter author gives the following analysis of rust compound found in one house:—

	Per Cent.
Oxide of lead	Trace.
Moisture	2·14
Silicious matter	0·40
Sulphur trioxide	3·51
Sulphur compounds	1·23
Naphthalene	2·17
Sesquioxide of iron	69·30
Carbon	20·75
Errors of experiment	0·50

I presume compounds similar to these are what we find in the services; and it is to our interest to prevent, as nearly as possible, this deposit. The necessary precautions seem to be to send out well-purified gas, free from naphthalene, and when using iron in the purifiers to see that it is thoroughly oxidized. Another precaution is to have the service well cleaned before laying, and to observe the same care when putting down new mains.

In the small town to which I have referred, I overhauled about 700 feet of 2-inch wrought-iron main; the complaint having come in of there being "no gas." This pipe was so full of scale and granular deposit that the little finger could just be slipped into it and over the top of the mass. This pipe had been in the ground about twenty years. The metal still remained in excellent condition. The line was thoroughly cleaned, and is still in service.

Electrolysis is a subject in which great interest is still taken; and it presents a problem which requires our very earnest consideration. As the situation now stands, it seems that we must either tie ourselves to the railway man or take the consequences. He would have us come under his protecting wing, when what we desire is to be in a position to protect ourselves. The subject is a large and weighty one, and cannot here be discussed at length. It might be argued that the electrolyte being decomposed by the current leaving the service—the elements being thrown against the metal, and the destructive action being purely a chemical one—any coating which will serve under ordinary conditions will be equally efficient as a guard against electrolysis. The effect of electrolysis is to accelerate or intensify the corrosion; and the action will increase in direct proportion to the strength of the current leaving the pipe. Special precautions are therefore necessary.

Can the destruction of our pipes by electrolysis be entirely prevented? As long as the law of divided circuits stands, and as long as the positive or negative bus-bar of our single-wire railway systems is in connection with the earth, this electrolytic action will continue, unless we can find a service coating that is either a non-conductor or waterproof and chemically inert. I have heard it said that cement-covered pipe is not affected by electrolysis. This may be true. In the absence of practical experience, I cannot say; but it would seem to me that, as cement is porous, absorbs moisture, and is liable to crack, this coating will not prove a cure. It is valuable, however, inasmuch as it is but little affected by the strongest acids. It would seem that with the use of cement as a coating, we should have to sacrifice the flexible joint at the main. When we have solved the problem of protecting our mains from electrolytic action, we shall have found a cure for the service.

It is well to do what we can to protect the pipe; but we should not work backwards. In connection with the mains, there are two propositions which confront us. The first is how we are to protect the mains that are now in the ground and laid with cement and lead joints; and the second, what precautions we must take when laying new mains? Suppose, in answer to the latter question, we say we will use rubber or other non-conducting gaskets at every joint, so as to lower the total conductivity of the line, and thus reduce to a negligible amount the current flowing through our mains. Do we know the current at each joint to be of negligible amount? The insulated joint does not seem to offer a solution of the problem.

A method proposed for main protection in general is to bond the mains to large conductors leading to the negative bus bar at the station, with the idea of so increasing the conductivity of the pipes that they will hold the current and part with it near the station through suitable conductors thus provided. This method does not meet the needs; for even if the mains are tied in at the station, the current will leave them to flow along lines of less resistance. Another method, and one which I know to be the practice in one of our large cities where the gas and electricity are under the same management, is to frequently survey the district, and wherever the potential of the gas-main is found to be higher than that of the track, neighbouring pipes, and structures, a connection is made with the main and these structures, and a conductor carried from the main to the negative bus-bar of the nearest sub-station. Great care is also taken to maintain a high efficiency in the rail bonds. It is claimed that if these bonds are well taken care of, and the rails are of sufficient area in cross section, very little current will escape into the ground.

I do not remember having seen any mention in our gas periodicals of the alternating current as a possible power for railways, or any note on alternating current electrolysis. An electrical engineer a short time ago remarked that he believed that within a few years all our electric railways would be operated, using the alternating current. I am not up in the subject, and simply state this for what it is worth.

A very interesting paper was published in the "Electric Club Journal" for November, 1905, entitled "Alternating Current Electrolysis," by Mr. S. M. Kintner, who experimented on wrought-iron pipe, which he buried 3 feet in the ground. The pipes were placed 18 inches apart, and each was connected to a terminal of a transformer giving 25 volts at 25 cycles. They remained connected for a year. The author concludes his article as follows: "While certain laboratory tests extending over short periods of time may indicate trivial losses due to alternating current electrolysis, the result of this long-time test, made under conditions approximating those met in service, shows quite conclusively that if there is any action it is very small."

In my present state of information, if I were called upon to invest money in laying and protecting service-pipes, I should proceed in accordance with specifications in part as follows: Metal to be used, steel or iron. Size of pipe, nothing smaller than 1¼ inches. Connection to main to be at side, if necessary to make pipe drip to main; otherwise the top flexible joint to be employed, made by using a service **T** and a street **L**, the former screwed into the main. Pipe never to be laid in ashes or refuse; where such soil is encountered, good clay or earth must be placed around the pipe. All pipe to be covered with a protecting coating. Coating to be used in good soil, such as dry clay, sand, and loam: The Hickenlooper coating applied by dipping the hot pipe in the hot compound, the pipe having first been tested under steam pressure for leaks. After the pipe is laid, it must be wrapped with muslin, and a second coat of the Hickenlooper paint applied. In the case of damp soil and saturated soils under gutters, ash, and refuse soils, &c., some pipe should be covered with cement 2 inches thick, some given a coating of liquid glass and then covered 2 inches thick with cement, others covered with pitch, using the traditional **V**-shaped trough, and others wrapped with muslin with two coats of the Hickenlooper coating.

* See "JOURNAL," Vol. LXX., pp. 1116, 1176.

SCOTTISH JUNIOR GAS ASSOCIATIONS.

Excursions of the Eastern and Western Districts.

The members of the Eastern District of the Scottish Junior Gas Association held their first annual excursion on Saturday afternoon, to the beautiful grounds of Hopetoun House, the seat of the Marquis of Linlithgow, permission to visit which had been kindly granted by Mr. Ralston, the factor to his Grace. About two dozen members attended, among those present being Mr. W. R. Herring, of Edinburgh; Mr. A. Waddell, of Dunfermline; and Mr. Forbes Waddell, of Queensferry. The company met at the Dalmeny Railway Station, and drove to Hopetoun, where sports were engaged in. The homeward drive began at 5.30 p.m. At the Viewforth Hotel, Queensferry, tea was served; the President in the chair. The Chairman proposed the toast of "The Honorary Members," which was suitably acknowledged by Mr. Herring. Mr. Forbes Waddell proposed "The President;" and Mr. Masterton "The Croupier"—Mr. Gracie.

The members of the Western District had their second annual outing on the 16th ult., when they joined the officials of the Glasgow Corporation in a cruise on the Firth of Clyde. The party left Glasgow by special train for Gourock, where they embarked on the *Duchess of Hamilton*, which had been specially chartered for the excursion. The steamer, with the Glasgow Postal Band on board, ran down the Firth to Ardrossan, and returned by the Kyles of Bute to Rothesay. Before landing at Rothesay, tea was served in the dining saloon. The party went on shore for an hour, and the interval was greatly enjoyed by all. At eight o'clock a start was made for Gourock; and the excursionists were back in Glasgow at 10.20 p.m. The weather was excellent.

REGISTER OF PATENTS.

Purification of Gas.

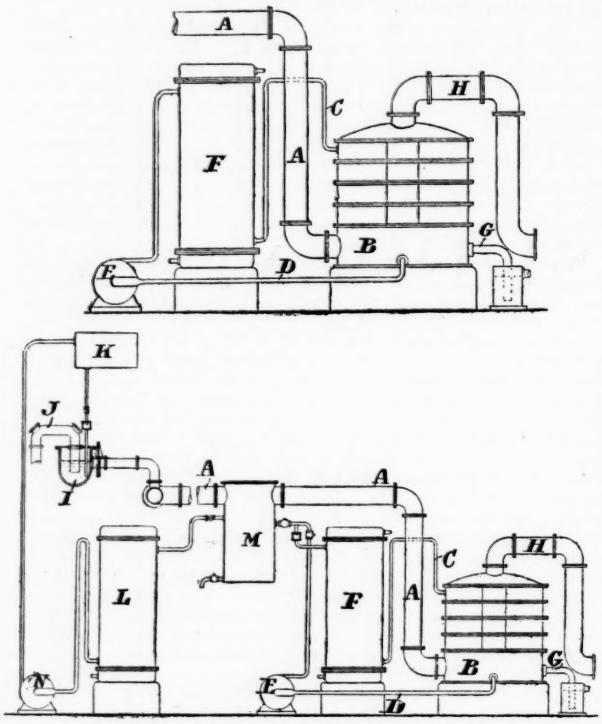
WILTON, G., of Mark Lane, E.C.

No. 2907; Feb. 6, 1906.

By the present invention, the patentee claims to have been enabled to "successfully dispense with the usual condensing plant, and to conduct the operations of removing tars and ammonia simultaneously, effecting a much more rapid cooling of the gases than has hitherto been possible, greatly facilitating and cheapening the working, and largely reducing the amount of cooling water required in the plant."

His proposal is to lead the crude gas from the retorts (say from the hydraulic main) directly through a circulation of gas liquor in one or more washers or scrubbers—the liquor being kept cooled by suitable means so as to be continually presented to the gas in a cooled condition. This cooling of the gas liquor is "an essential and indispensable condition" of the invention.

The liquor is preferably passed through the scrubber in an opposite direction to that of the gas. "As the hot gas is thus caused to bubble through a current of liquor which is constantly being presented to it at a much lower temperature, a rapid interchange of heat is effected, and the gas is cooled to the temperature necessary for the precipitation of its tarry constituents much more quickly than has hitherto been possible, and at the same time the ammonia, or a very large proportion of it, is efficiently absorbed. Moreover, the cooling and ammonia extraction can be effected practically entirely by the gas liquor arising



Wilton's Gas Purifier.

from the distillation; only a relatively small quantity of water being required for cooling the circulated gas liquor, and this cooling can be effected by a condenser of relatively very small dimensions."

For the purpose of the invention, there may with advantage be employed the type of ammonia still described in patent No. 24,832 of 1901; the circulation of cooled liquor being allowed to pass down through the apparatus, while the gas to be treated is admitted by the inlet in the base, and passes up through the descending liquid in the trays or chambers in the apparatus, which thus serves as a washer or scrubber.

To show the manner in which the invention can be carried into effect, two typical arrangements of apparatus are described by the patentee.

In the first, the gas is led by the main A direct to a washer or scrubber B, consisting of a superposed series of chambers or trays through which a stream of liquid can descend, while the gas is admitted at the bottom of the series and allowed to bubble up through the chambers in succession. Through this scrubber a constant stream of cooled gas liquor is circulated. At the commencement of the working, this circulation is started by a suitable quantity of cold water; but as the distillation proceeds, "the water evolved will be found practically sufficient for maintaining the circulation." The gas is admitted at the base of the scrubber, and in rising through the trays meets the descending stream of gas liquor admitted by the pipe C. The liquor is drawn away from the scrubber, through the pipe D, by the pump E, which delivers it through the tubular cooler F and pipe C to the scrubber again. The cooler F is supplied with cold water, and thus a circulation of gas liquor is maintained through the scrubber at a temperature greatly below that of the gas.

The temperature of the liquor entering the scrubber may (for example) be kept at about 60° Fahr. The gas rising through the stream of cooled liquor in the scrubber is rapidly cooled, and the tarry matters are precipitated and separated from the gas, together with the greater proportion of the ammonia. The light tars precipitated from the gas in the scrubber absorb and dissolve the naphthalene and heavy tars, so that a constant circulation of the cooled gas liquor and absorbed tars can be maintained through the plant to cool the gas and separate further quantities of tar and ammonia. From time to time as the liquor accumulates by accretion of water of distillation, or as required, the mixed tar and liquor may be run off from the washer by a pipe G discharging into a syphon.

Any ammonia which may not be absorbed in the scrubber can be removed by passing the gas on by the pipe H through another scrubber supplied with water or containing a solution of sulphurous acid or a suitable sulphite. Or this may be effected by admitting sulphurous acid gas to the scrubber with the gas to be purified.

This method of cooling and scrubbing may with advantage be combined with the method of cooling the gas and reducing the deposit of heavy tars in hydraulic mains as described in patent No. 25,275 of 1905. The second illustration shows a form of apparatus suitable for carrying out the invention in this manner. I is the hydraulic main and J one of the dip-pipes from the retorts. K is a tank for gas liquor connected to the main by a pipe fitted with a valve and sight glass. The tank is likewise connected to a tubular or other cooler, L, which is, in turn, connected at the top by a pipe fitted with a valve to a tar-separator M interposed in the gas-main A with the object of separating out the thick tar from the gas, together with a portion of the liquor formed by the water of distillation. The main is led to the scrubber B, as in the previous arrangement. N is a pump for maintaining the circulation of gas liquor through the apparatus. In consequence of the gas being caused to bubble through a continuous circulation of constantly-cooled liquor passing through the hydraulic main, the portion of light tars separated therein absorbs and dissolves heavy tars and naphthalene, so that a fluid mixture and light and heavy tars are carried along in the gas liquor to the separator M, where the thick tar and liquor separate from each other and the thick tar can be removed from time to time. A proportion of light tars is preferably retained in the liquor circulation to ensure the absorption and solution of further quantities of heavy tars and naphthalene. The hot liquor is drawn away from the separator by the pump N through the tubular cooler L to the tank K, which supplies the hydraulic main. The liquor is thus circulated through the separator, cooler, and hydraulic main, and constantly increases in bulk as the distillation proceeds; while, by means of the cooler L, the liquor admitted to the hydraulic main is kept at a suitable temperature to ensure the desired result.

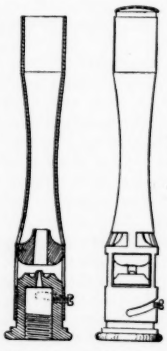
Incandescent Gas-Burner.

BUSQUET, R., and RAMASSOT, M. R., of Lyons.

No. 2980; Feb. 7, 1906.

Date claimed under International Convention, March 27, 1905.

This burner consists of a tube in which the injector below the main air inlets is formed in two parts—a nozzle and a tuyere—arranged one above the other in such a manner as to form between them an annular channel of cone section for the inlet of air. The burner-tube, the upper parabolic portion of which is provided at its base with air inlet holes, has its lower portion cylindrical, and also provided with holes. The injector is composed of two parts. The upper part forms a nozzle, which has the general shape of two conical frusta having their larger ends joined together; the lower part, to be screwed upon the gas-pipe, is provided with a frusto-conical top, the small base of which is crater-shaped, and from it emerges a small tuyere. The two parts forming the injector are thus arranged in such a manner as to form between them an annular channel of truncated conical section.



The lower piece carries a stop screw sliding in a groove formed in the cylindrical end of the tube, so as to suitably regulate the section of the annular channel.

The working of the burner is based upon the following principle: By means of the annular channel of truncated conical section, "the air is led in the most suitable direction and caused to mix with the gas-jet at the most suitable point, in such a manner as to prevent eddies and other losses of head, and to form a moving column of air and gas of maximum kinetic energy. This column traverses the upper nozzle portion of the injector and occasions the draught of air necessary for the formation of the gaseous mixture. Finally, this arrangement is made with the view that the initial jet of gas at high pressure and small volume may be transformed into a moving column of air and gas of greater volume, more suitable for the subsequent in-drawing of the air, but still retaining its kinetic energy. This combined injector is therefore a real transformer of energy."

Anti-Pulsators for Gas-Conduits.

THORP, T., of Whitefield, Lancs.

No. 5194; March 3, 1906.

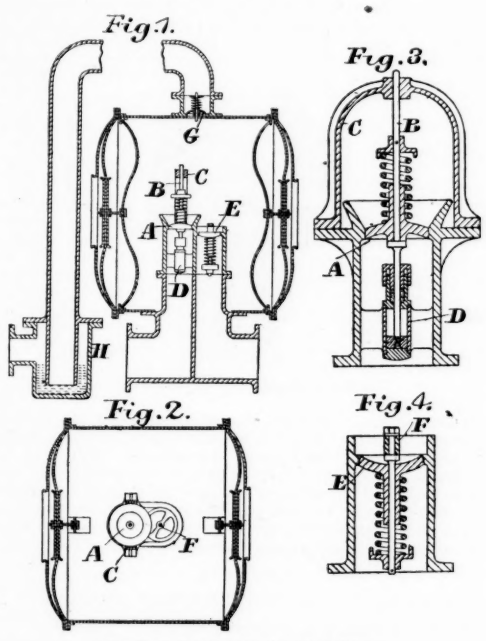
This invention, relating to anti-pulsators for gas-conduits, is more particularly applicable to anti-pulsators through which gas-engines are supplied and which are connected to rotary gas-meters. The invention consists in an improved arrangement of the inlet valve so that it retains its position during the normal pulsations of the gas pressure, but is able to lift freely when the pressure in the anti-pulsator is suddenly reduced; and in the arrangement of a back-pressure valve in the outlet pipe, and of a relief valve (or its equivalent) on the casing—the object of the invention being chiefly to prevent the diaphragms or casing of the anti-pulsator from becoming damaged by an excess of vacuum or pressure.

Fig. 1 shows a vertical section and fig. 2 a horizontal section of the anti-pulsator; fig. 3 is a vertical section of the inlet valve at a right angle to fig. 1; and fig. 4 a vertical section of a back-pressure valve.

The anti-pulsator (any ordinarily used kind, its arrangement not forming part of this invention) consists of a casing with diaphragms stretched over its ends and pulled inwards by springs, preferably of the kind described in patent No. 5791 of 1905. To the bottom of the casing an inlet and an outlet pipe are fixed, which are preferably formed in one casting divided by a mid-feather, and having branches outside the casing for connection to the gas-conduit as usual. The top of the pipes is preferably formed of a separate casting bolted to the lower part in order to facilitate the tooling of the valve-seatings and other parts.

At the top of the inlet pipe, a disc or mushroom valve A is arranged to fit upon a seating or merely fill the orifice of the pipe as shown—an absolute sealing of the inlet not being required. Preferably the valve is surrounded above its seat by a conical funnel, so as to obtain a gradual enlargement of the outlet round the valve and a longer lift to the full opening. The valve is formed with a boss, which slides upon the spindle B, the valve resting upon a collar formed on the spindle, and being held down upon the collar by a spring, the upper end of which bears against a cap, or its equivalent, fixed upon the valve-spindle. The upper end of the spindle is guided in a bow-shaped bracket C; and its lower end has a piston formed on it, which slides in a dashpot D of the usual construction.

When the engine supplied through the anti-pulsator is stopped, the valve A will close and remain in the position shown till the engine is started again. Then the gas in the anti-pulsator is suddenly drawn out of it, and the valve tends to rise; but if it were fixed on the spindle it could only do so slowly, on account of the dashpot. The valve, however, can lift freely against the pressure of the adjusted spring, and gas can pass into and through the anti-pulsator, thereby preventing the



Thorp's Anti-Pulsator for Gas-Mains.

diaphragms from being drawn inwards to an excessive extent. The spring then draws up the piston in the dashpot, the liquid therein passing from the upper to the under side of the piston through a small groove, and prevents the valve closing again when the suction of the engine stops, which would occur with an ordinary free-lifting valve or a valve directly connected to the diaphragms, and cause pulsations in the inlet pipe that would prevent correct registration by the rotary meter. The valve-spindle will continue to rise till the valve opening is large enough to allow a sufficient quantity of gas to pass for maintaining in conjunction with the movements of the diaphragms a uniform mean difference between the pressure in the anti-pulsator and that in the inlet pipe, after which the valve remains stationary, and only rises or falls gradually if the consumption of gas by the engine or the pressure of the gas supply increases or decreases—the valve remaining free to lift on the spindle if any sudden exhaustion of the anti-pulsator occurs from any cause.

With gas-engines back-firing frequently occurs, which not only produces excessive pressure in the anti-pulsator (destroying the diaphragms or casing), but also, as the inlet valve cannot close suddenly on account of the dashpot, causes a return flow of great pressure in the supply pipe and injuriously affects the meter and prevents its correct registration. To obviate this, a back-pressure valve is arranged in the outlet pipe, which closes when any return flow of the gas occurs. This may consist, as shown, of a mushroom valve E, with conical seat sliding on a spindle fixed in a central boss F of the valve seating; the valve being supported by a light spring only strong enough to support the weight of the valve.

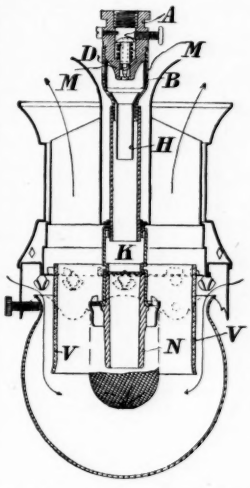
In order to further protect the anti-pulsator against damage if, through a failure of the back-pressure valve or from any other cause, the pressure in the casing rises above the pressure the anti-pulsator can safely support, a safety valve G, of any usual form, as shown, similar to the back-pressure valve, or a hydraulic seal pot H, is connected to it.

Inverted Incandescent Lamp.

GRAETZ, M., of Berlin.

No. 3756; Feb. 15, 1906.

In this inverted incandescent gas-lamp, two or more chimneys for leading off the products of combustion are employed; and the burner is enclosed by a glass globe closed at its lower side—the object being "to provide simple and efficient means whereby more complete and perfect combustion is obtained than hitherto, and the bunsen-burner inlets protected from the combustion gases."



A cylindrical pipe V of transparent material (arranged at a certain distance inside a closed glass globe) is designed to guide the air to the burner in the special way indicated by the arrows. For the products of combustion, an outlet device is attached to the upper side of the pipe, consisting of two or more chimneys, each forming a pipe shaped in cross section like a segment of a circle. The chimneys enclose the burner-tube, and are of such a height that the products of combustion leaving at the upper parts are unable to get to the holes leading to the air-inlet openings M of the bunsen-burner.

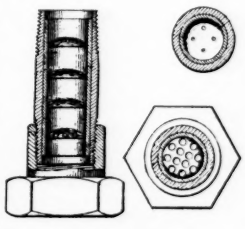
The bunsen-burner consists of a casing A, formed at its lower part with a nozzle D. In the casing is arranged a set-screw to press down the regulating arrangement which adjusts the passage of the gas through the nozzle opening—a spring being provided normally pressing the hollow cylinder upwards. The cylinder has on its under side two openings; and there is a pin adapted to more or less close the opening of the nozzle. A flat bridge allows the gas to flow from the inside of the tube to the nozzle, which is encircled by a sieve or gauze held by the tube B, of which the tube H is an extension—the latter entering into the burner-tube, which is secured at its under part to chamber K, which bears in its lower part the sieve or gauze. To the chamber K is attached a tube N, of porcelain or other heat-resisting material; and the part N carries the incandescent mantle in the usual manner. The whole lamp is enclosed by a casing, which allows the air to flow through openings at several points to and around the cylinder V.

The mantle is surrounded by the glass tube V; and between it and the closed glass globe the air is drawn in the direction of the arrows to the mantle. In this way, "only so much air as is sufficient for a good combustion of the gas and air mixture" is brought into the globe, and "very perfect combustion" is said to be obtained. A chief point of this arrangement is that the chimneys (of which there may be two or more) are arranged separately, so that the burner-tube is not affected by the heat of the burner-flame and of the combustion gases. The space between the burner-tube and the chimneys is also always kept cool, as fresh air can continually enter the spaces.

Gas-Pressure Regulators and Governors.

HILLIS, R. & W. J., of Brooklyn, U.S.A.

No. 5328; March 5, 1906.



This device is to be employed for regulating the pressure and governing the flow of gas from a meter. It is applied in connection with the service-pipe from the meter as shown. It is composed of an outer imperforate cylindrical tube section having threaded ends, an inner removable imperforate cylindrical tube section, a series of perforated and concaved discs of equal diameters located in the inner tube section, and frictionally held in place therein—the perforations in the discs varying both in size and in number from the beginning to the end of the series, and threaded unions for removably coupling the device with the meter and with the gas service-pipe.

Safety Gas-Burner Attachments.

URY, S. H., of San Leandro, California, U.S.A.

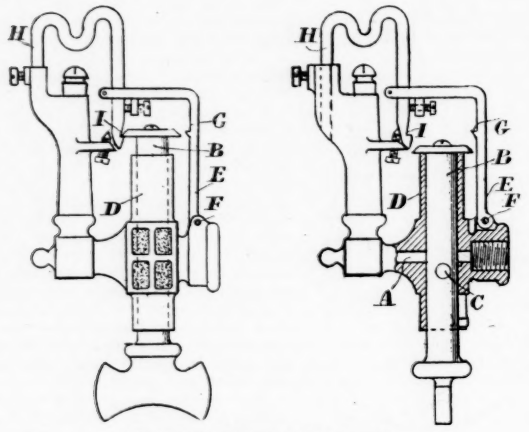
No. 6174; March 14, 1906.

In these safety attachments for gas-burners (which act to shut off the gas supply automatically as a result of the flame being extinguished), the heat of the flame is caused to expand a metallic arm or the like, and the slight increase in length of the latter is utilized to hold open the gas-tap; and the present invention has more particular reference to the means employed for supporting the plug when the gas is first lit. The first catch or trigger for the plug is situated upon a gravity-actuated arm; while the second one is mounted on the extremity of the expansible arm itself. The plug is arranged to drop from the first catch on to the second one, and subsequently, when the flame is extinguished, to drop from this second one so as to cut off the supply of gas.

The sectional elevations (p. 112) show the attachment in its closed position, and open.

In line with the socket, through which connection is made with a source of supply, is a passage A leading to the burner. A cylindrical plug B is perforated, preferably in line with the handle, to indicate the position of the hole C. The top of the plug has fitted upon it a circular bevelled plate or short frustum of a cone, the periphery of which

projects beyond the vertical tube D, in which the cylindrical plug is both turnable and slidable. The plug normally drops by gravitation, so that the passage C through the plug is out of line with the passage A, which communicates with the burner. Therefore there can be no communication between the source of supply and the burner until the plug is raised and turned to bring the passages C and A in line with each other.



Ury's Safety-Burner Attachment.

According to the present invention, an arm E is loosely fulcrumed at F and bent at right angles. The weight of this portion projects transversely above the disc above the tube D, and causes the inner side of the arm E normally to rest against the edge of the disc. This side of the arm is fitted with a trigger or catch device to engage, and maintain lifted, the disc and plug B. For this purpose a projecting spur G acts to engage the edge of the disc when the plug is pushed upwardly.

When it is desired to turn on the gas, the plug B is pushed up until the edge of the disc engages with the spur G, which will prevent the plug from again dropping by gravitation. The plug being turned until the passage C is in line with A, gas will flow and be ignited at the burning tip.

The improved form of the expansible arm is shown at H. This arm is of some metal of a character which will cause it readily to expand by the application of heat—such as brass—and one end of the arm is socketed or otherwise fixed at the side of the burner. As here shown, there is a projection having a vertical opening into which one part of the arm H extends, where it may be held by a set screw. A portion of the arm, which is shown as sinuous, extends across the burner through the flame, and the straight portion extends downwardly substantially parallel with the fixed part. The lower end has a notch I in close proximity with the edge of the disc which is opposite to the spur G and is slightly below the plane of the spur; so that when the plug has been raised and engaged by the spur, the notch will be in such position that, if the gas is lighted, the expansion of the heated arm will cause it to move outwardly until the notch engages the disc. If from any cause the gas should be extinguished, the cooling of the arm causes it to contract until the notch is disengaged from the disc, and this takes place before the spur is again brought into engagement with the disc. Therefore, as soon as the disengagement takes place, the plug B immediately drops by gravitation until the opening C is below, and out of line with, the passage A, thus automatically extinguishing the gas.

Argand Gas-Burner.

GRAFTON, W., of East Ham.

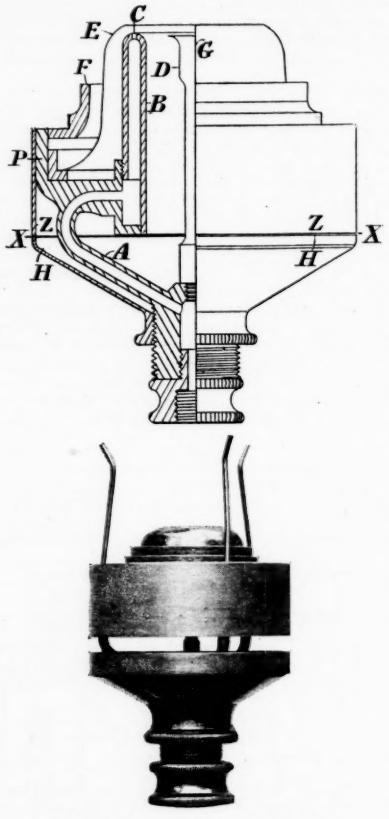
No. 7897; April 2, 1906.

In conjunction with the centre peg constructed in accordance with the patentee's invention of 1904 (No. 5529), and placed in relation to the steatite orifice ring at its proper position and distance, he now purposes to use two annular rings, of known construction, which will, the one, deflect a suitable current of air upon the exterior of the flame, and the other providing a secondary supply for the complete combustion of the flame, "to ensure its economic but complete oxygenation and to give stability and shape to the same."

Although fully aware that dampers of different construction have been employed to regulate a part or the whole of the air to argand burners, he intends using a damper to regulate, if necessary, the whole volume of air entering the burner, so that the gas-flame shall, at all times, "be fed with a regular but duly proportional quantity of air by way of the several air ducts or passages, such proportions or ratios being self-governed by the chimney employed according to the volume of air allowed to enter the burner." The damper may be constructed to slide, turn, or screw in such manner that it effectively controls the whole of the air from entering the burner, independent of the length of chimney employed—that is, when the damper is closed, the gas burns no longer in the chimney but at the top of it; the whole air supply, when once past the control of the damper, being free to find its way to the gas-flame by the air-passages provided.

The patentee claims that his invention is particularly applicable for testing any illuminating gas; and he finds that he obtains "greatly increased, but relatively true, candle power with a nominally fixed or diminished consumption of gas by the better regulation and direction of the air entering the burner effected by the damper and the properly-shaped and positioned peg and suitable length of chimney necessary for the combustion of the volume of gas used—thus securing the greatest illuminosity."

A is one of three pipes supplying gas to the annular steatite ring B, where the gas finds an outlet at the orifices C. The shaped and properly positioned centre peg is shown at D; while E is an annular ring which deflects a suitable current of air on the exterior of the flame, and F provides a secondary supply for its complete combustion. The supply to F passes up and between the sides of the supporting arms P. The whole of the air entering at X is free to pass upwards by way of D, E, and F. By raising the damper H so that its upper edge abuts against the part Z, the common inlet X is shut, thereby preventing any air



Grafton's Regulating Argand Burner.

entering the burner. The glass chimney "provides the draught and so preserves at all times the ratio between the volumes of air passing through the passages of the burner," whether the damper H be wide open or partly closed. One form of damper is shown nearly closed at X, thereby reducing the effective power of the chimney to draw in air; but what air does enter is "free to pass upwards to the flame according to the distributing power of the chimney, by that means securing a uniform but proportionate supply through the burner."

APPLICATIONS FOR LETTERS PATENT.

14,558.—FARNSWORTH, J., "Generating gas." June 26.
14,572.—CHANDLER, S. & J., and MULLINS, E. M., "Incandescent burners and mantle supports." June 26.
14,587.—BRAUNSTEIN, J., "Igniting devices." June 26.
14,637.—BROOKE, R. M., "Regenerator furnaces." June 27.
14,640.—RITCHIE, J. H., "Mantles." June 27.
14,643.—SMITH, H. E., "Petrol gas." June 27.
14,649.—MILNE, J., and O'CONNOR, H., "Indicating mechanism for test gas-meters." June 27.
14,655.—SELLARS, J. C., "Conduits" June 27.
14,661.—KISSEL, W., "Automatically lighting gas-lamps." June 27.
14,665.—BOURDOS, A., "Mantles." June 27.
14,673.—RIDER, S. J., "Shade holders." June 27.
14,677.—FORSTER, A. L., "Gas-producers." June 27.
14,714.—COLLETT, H. VAN B., and WHITFIELD, C., "Producer gas." June 27.
14,731.—CRANMER, W. G. S., "Production of gas." June 28.
14,790.—PARKER, T., "Destructive distillation of coal." June 28.
14,797.—ROBIN, J. I., "Anti-vibration supports." June 28.
14,798.—ROBIN, J. I., "Mantles." June 28.
14,819.—RECH, F., "Street-lamps." June 30.
14,877.—RECH, F., "Inverted incandescent gas street-lamps." June 30.
14,914.—MASONS GAS POWER COMPANY, LTD., WRIGHT, T., and HOLLIS, A., "Gas-producers." June 30.
14,923.—PIERSON, J. & O. G., "Producer-gas engines." June 30.
14,947.—SIEMENS, F. K., "Regenerative furnaces." June 30.
14,954.—HADDAN, R., "Stoves for gas and petroleum." A communication from Aktien Ges. vorm. C. H. Stobwasser and Co. June 30.
14,964.—SCHUMACHER, W., "Quenching, screening, and conveying coke." June 30.

Ipswich Gas Company's Assessment Appeal.—This matter was mentioned at the Ipswich Sessions last Thursday, when it was arranged that, for the convenience of Sir Edward Boyle, the case would be taken by the Recorder on the 30th inst.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

Amendment of the Gas-Works Clauses Act.

SIR,—I am pleased to find that my recent letter respecting the amendment of the Gas-Works Clauses Act seems to cling to your editorial memory.

I am of opinion that it would be a wise step for the Institution of Gas Engineers to promote a Bill to embody in one General Act all, or as many as they can get, of the concessions recently obtained by private undertakings; and I am also convinced that Parliament would concede to the representations of an entire industry many things which they would not grant to individual undertakings.

The most important point, in my opinion, is freedom for us to make whatever bargains are necessary to secure our business against the competition of suction plants, &c., similar to that now enjoyed by the electric lighting industry. By the most recent legislation, both companies and corporations are restricted to a beggarly 15 per cent. reduction from the lighting price for such purposes, *plus* 10 per cent. for prompt payment; while the electric lighting industry is absolutely unfettered, and almost every town offers electricity for power and heating purposes at reductions varying from 50 to 80 per cent. off the price for lighting.

I feel confident that if this fact is placed before Parliament with all the weight our industry can command, Parliament is bound to grant us the same terms as our chief competitors enjoy. They would, however, take a very different view if this matter were simply put forward by an individual concern.

This one object would be in itself sufficient to justify the keenest struggle the gas industry could make, and would alone amply repay whatever outlay the associated undertakings might incur. But when so many other advantages can also apparently be had for the asking—for they are already granted to individual companies—it seems to me that we deserve to be dubbed in the words of our rivals, "A Moribund Industry," if we have not sufficient energy to make the necessary effort.

Wakefield, July 6, 1906. H. TOWNSEND.

Mr. William Smith on Widnes Gas.

SIR,—I have read Mr. Smith's letter in your issue of the 3rd inst., and notice that he, or someone representing him, has paid a recent visit to Widnes with a photometer, to test the illuminating power of the Widnes gas, with the result that his finding is to his own entire satisfaction. Had any spirit of fairness animated Mr. Smith, he would have requested my attendance, or that of a representative, to see that the testing was fairly and properly conducted. I have several times publicly stated that the Widnes works are always open; and I would welcome Mr. Smith or anyone else who desires to inspect my methods of manufacture or to check my testings. But this secret and hostile attempt to discredit my work, I leave to my compeers to judge of its fairness or otherwise.

Mr. Smith's estimate of the selling price of coke in Widnes is as absurd as it is erroneous, as 85 per cent. of our coke is sold under contract, and the total average receipts last year were below the highest contract price of 8s. 9d. per ton. Mr. Smith goes on to give the cost of his gas at Bolton as 3·12d., after allowing for what he is pleased to term his three candles superior quality. While he is at it, Mr. Smith might go a step further, and by continuing the same line of argument to its logical conclusion—*i.e.*, take credit for six candles difference, instead of three—wipe out the cost of his gas altogether. Surely this is the climax of absurdity.

In the remarks of Mr. Smith to which I took exception, a forefront place was awarded to Darwen, which I now notice Mr. Smith finds it convenient to leave severely alone. But why continue, in the face of Mr. Smith's inglorious remark that his letter ends the correspondence on his part?

The whole of Mr. Smith's figures and statements are a feeble attempt to extricate himself from the meshes of an indiscreet after-dinner speech—a speech which he told me at the recent Gas Institution meeting he did not at all mean in the sense that it was reported, which is an admission that he now apparently lacks the good grace to make public.

Widnes, July 4, 1906. ISAAC CARR.

Gas Affairs at Nottingham.

SIR,—The letter of Mr. W. J. Cecil Hayward in your last issue, in defence of the late Chairman of the Gas Committee, comes opportunely with the publication of the financial results for the past year's working. These speak for themselves, and are a credit to the administration. It would be interesting to know to what extent these results are due to the initiative of the late Chairman of the Committee.

Now the general tone of Mr. Hayward's remarks can only have one interpretation, although he labours the point to make it appear otherwise. To take up the whole of the points raised would be trespassing too much upon your space; but there are a few which I should like to deal with, and to show the misuse of a few terms applied.

Gas-works of the size of Nottingham and other large manufacturing concerns, in order to keep to the front in commercial enterprise, must spend annually large sums of money upon experiments in the way of machinery, &c.; and the term "expensive" cannot be applied when the results prove otherwise. Doubtless those firms in Nottingham who are in the forefront to-day have done this; and the term "progressive" may be applied with justice to them. It is, however, noticeable that when lace factories have been burnt down, they have not been re-built, but removed to other districts along with others. Then, again, the retention of the annual Goose Fair, with its attendant rowdyism and other evils, shows that the term "progressive" applied to the town at large has its ludicrous as well as its serious application.

Mr. Hayward and his friends might surely, with advantage, give their attention to other matters instead of bickering over a department which does so much to relieve the excessive rates.

The question of manufacturers putting down their own gas plants is surrounded with ambiguity, as it applies to suction gas plants for gas-engines, and this gas cannot be used for lighting purposes by itself. The 33⅓ per cent. advance in salary represents the salary which should have been given in the original terms of the appointment, and shows some knowledge of trade discounts.

I enclose my name and address, but not for publication.

July 7, 1906. OBSERVER.

The Composition and Valuation of Gas Oils.

SIR,—In reply to Mr. Edwin M. Bailey's letter in the "JOURNAL" for July 3, we admit that there are a few errors in the uncorrected tables distributed to members, which were hurriedly copied by a clerk from rough pencil notes at the last moment to obviate writing on the blackboard.

The errors are, however, few. Averages of averages do not agree when multiplied out.

$$\frac{g_1 + g_2}{2} \times \frac{h_1 + h_2}{2} \quad \text{is not identical with} \quad \frac{g_1 h_1 + g_2 h_2}{2}.$$

We must decline to enter into any further correspondence until the authorized and correct report has appeared; and we trust that our critics will do us the kindness to wait till they have read what we have written.

Burnley, July 5, 1906. JNO. P. LEATHER. RAYMOND ROSS.

[What Messrs. Leather and Ross will write for "authorized" publication—in view of their above admissions of error, and the criticism to which their paper has been subjected—will naturally not be what was read at the meeting referred to in the "JOURNAL" for June 19, and which formed the basis of what then appeared in our pages. It is much to be regretted that they circulated among the members of the Society of Analysts "uncorrected tables . . . hurriedly copied . . . from rough pencil notes." No intimation to this effect was made at the time the tables were presented. It is, of course, easy now, after what has transpired, for a correct report to be prepared and published in the Society's "Transactions;" but it is not right for there to be any substantial difference between a paper presented to, and discussed by, the members of any scientific body and the paper as subsequently printed in the so-called "authorized" report—ED. J.G.L.]

The Officials of the Dublin Gas Company.—In an article last week referring to the International Exhibition to be held in Dublin next year, Mr. Francis T. Cotton was inadvertently described as Engineer and General Manager of the Alliance and Dublin Consumers' Gas Company—a mistake that he pointed out directly on receipt of his copy of the "JOURNAL." Mr. W. F. Cotton, junr., M.Inst.C.E., the Chief Engineer of the Company, has also written to point out that Mr. F. T. Cotton is Secretary and Manager (not Engineer and General Manager); and he adds: "I should be glad if you would insert a short paragraph, setting the matter right. I am exceedingly sorry for bothering you; but I find that already the impression has gone abroad that I am not Chief Engineer."

A Big Steel Water-Main Contract at Leeds.

At last Wednesday's meeting of the Leeds City Council, Mr. J. H. Armitage moved the acceptance of the tender of Messrs. Clayton, Son, and Co. for the supply of about 11¾ miles of steel pipes intended to be laid between Kettlesing and Kirkby Malzeard, for the sum of £69,435. This, he said, was the beginning of the second step which the Council had to take in the construction of an aqueduct to bring the water from the new works in the Ure and Colster Valleys. The first step was the making of the Kettlesing tunnel, which was 5000 feet in length. The second step was the laying of a double line of pipes more than 22 miles long. The Water Committee now proposed to let by tender 11¾ miles, which was about a quarter of the whole work. In making an aqueduct, great consideration had to be paid to the questions of diameter, leakage, freedom from obstruction, and strength of the pipe-line. Up to now, the Committee had entirely confined themselves to using cast-iron pipes; and water engineers had been almost unanimously of opinion that cast-iron pipes should be employed for this purpose. But the Leeds Corporation were now asked to make what was comparatively a new departure, and that was to put a pipe-line down in steel instead of cast iron. For a long time water engineers were quite opposed to the idea of using steel pipes. The Bradford Corporation, under the guidance of their able Engineer, Mr. J. Watson, were the first Corporation in the country to adopt the plan of laying a steel aqueduct; and since then other engineers had followed suit. When the work was complete, Leeds would have the longest steel pipe-line that had so far been laid. The result of inquiries from engineers, and other investigations, was to show that steel was preferable to cast iron on three out of four of the points he had named. He expressed gratification that the contract should be let to a Leeds firm—a firm who had specified that the whole of the pipes should be made in Leeds. There was one tender below that accepted; but the amount was only some £277 less, and the advantages contained in the offer accepted outweighed this small sum. The making of the pipes would practically start a new industry in Leeds. The proposal was agreed to.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: Kingston-upon-Hull Corporation Bill.

Bills reported: Cardiff Gas Bill, Cheltenham Gas Bill, Huddersfield Corporation Bill, Metropolitan Water Board Bill, Peterborough Gas Bill, South Suburban Gas Bill.

Bills read the third time and passed: Epsom and Ewell Gas Bill, Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, South Suburban Gas Bill, Uxbridge Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill brought from the Lords, read the first time, and referred to the Examiners: Great Yarmouth Water-Works and Lowestoft Water and Gas Bill.

Bills reported: Sutton District Water Bill, Cumberland Electricity and Power Gas Bill [Lords], Glamorgan and South Wales Water Bill [Lords], Newport Corporation Bill [Lords], South Lincolnshire Water Bill, Wolstanton United Urban District Council Gas Bill [Lords].

Bills read the third time and passed: Bury Corporation Bill [Lords], Kingston-upon-Hull Corporation Bill, Newtownards Urban District Council Bill [Lords].

On Monday last week, a return was ordered, on the motion of Dr. Macnamara, in regard to applications for Provisional Orders and appeals to the Board of Trade respecting electricity undertakings from session 1896 to session 1905 inclusive. The particulars required are to be grouped in four divisions: (1) Applications for Provisional Orders in respect of the Administrative County of London and other areas; (2) appeals to the Board of Trade, during the ten years ended March, 1906, in regard to works, by local authorities and companies; (3) applications and appeals to the Board of Trade in regard to change of pressure during this period; and (4) applications by local authorities for the approval of the Board of Trade in regard to hours of access to street-boxes.

PONTEFRACT CORPORATION BILL.

House of Lords Committee.—Thursday, July 5.

Before Lord CLIFFORD OF CHUDLEIGH, *Chairman, Lord* COLCHESTER, *Lord* WYNFORD, *Lord* RITCHIE, *and Lord* SANDERSON.)

This is a Bill "to vest in the Corporation of Pontefract the undertakings of the Pontefract Park Trustees and the Pontefract Gas Company, and to make further provision for the local government of the borough and the water supply thereto, and for other purposes."

Mr. WEDDERBURN, K.C., appeared for the Pontefract Corporation; and Mr. FORBES LANKESTER and Mr. CLEASE represented the Pontefract Gas Company.

Mr. WEDDERBURN, on behalf of the promoters, stated that the proposal of the Bill was to transfer by purchase the undertaking of the Gas Company. The Company had passed a resolution against purchase by the Corporation; and all the correspondence that had taken place on the subject was without prejudice. The Company had exceeded their capital expenditure. The amount they had to pay in dividend and interest to the shareholders was larger than it should be, and placed a barrier between the consumer and his getting cheap gas. The land which they possessed was in excess of their needs. They had 79 retorts where 37 were sufficient. Their buildings had also been of an extravagant character. The amount of gas they sold represented £904 of capital per million cubic feet. This was out of all proportion, and conclusively showed that there had been an extravagant capital expenditure. Under the present circumstances, the proportion ought to be £600 instead of £904. The increase in the production and sale of gas had not been great, because the Company had not made gas popular in the district. Although they had not been increasing their business, they had increased their capital expenditure. If they spend revenue upon capital matters, it meant that, instead of carrying their revenue to what they should carry it, they obtained what they wanted for capital out of revenue; and this was how they had succeeded in keeping out of Parliament for 33 years. Both the population and the rateable value had increased year by year, and there had been complaints against the Company for not having extended their mains. The existing price of gas was 2s. 11d. per 1000 cubic feet, which was high when it was remembered that the works of the Company were close to the coalfields—in fact, there was a colliery within the borough. The policy of purchase was a matter which had for a long time been considered by the Town Council. The Company were approached in January, 1905; and the townspeople were in favour of the Bill. The correspondence and conduct of the Company showed clearly that the sole question was not one of principle of transfer, but merely one of the terms upon which the transfer should be made. Prolonged negotiations took place between the Company and the Corporation, showing that the question was merely one of price. Throughout the whole of the correspondence, there was not a single word, except a letter on Jan. 27, with reference to the principle of transfer. The Directors and the shareholders passed no resolution for over a year, although it would have been perfectly easy to have summoned the shareholders during 1905. It was not until the Bill was deposited that they called the shareholders together and decided to petition against it. The shareholders had got their full dividend; and therefore the time was opportune for such a transfer. On May 4, the House of Commons decided to give the Corporation the powers for which they asked.

Mr. *William Haddock*, the Town Clerk of Pontefract, was the first witness to give evidence in support of the Bill. He stated that the question of purchase had originated in the Town Council meeting. There had been no public meeting in favour of the Council taking over the undertaking. The authority of the ratepayers was given to the Bill in January.

Mr. *George Brown*, the Chairman of the Sanitary Committee of the Corporation, said that there had been complaints as to the manner in which the Company had taken up the streets and left them in an indifferent manner afterwards. They had delayed the extension of their mains for the purpose of public lighting; and only 40 per cent. of the houses in Pontefract were supplied by the Company. The price of gas should be less. At a meeting of the Directors and representatives of the Corporation on June 21, 1905, three Directors (who were also large shareholders in the Company) asked for a price to be named; and there was no question about it at the time that they were in a frame of mind to negotiate with the Corporation. The Directors retired to a room, and afterwards said that the matter would rest with the shareholders. The representatives of the Corporation, however, knew that the Directors held a large portion of the shares, and whatever decision they came to would go a long way in the matter of negotiations. After the Bill had been deposited, the Company showed a change of front, which might render useless the expense to which the Corporation had been put.

Mr. *Ramsden*, the Mayor of Pontefract, described the quality of gas as "very poor indeed." The interest of the consumer had not been considered; and the feeling of the people in the district was rather in favour of the Corporation purchasing the Company's works. With regard to the extravagance of the Company, it had been said that the scrubber had only cost £60; but he should say it had cost more than ten times that amount.

Mr. *F. W. Pease*, a member of the Pontefract Town Council, confirmed the statement which had been made as to the opening up of the streets. He was a shareholder in the Company, and was in favour of the Council having the concern handed over to them at a reasonable price. He had had to complain on many occasions of the low pressure of the gas.

Mr. *Charles Lowden* agreed that the quality of the gas had not been good, and the time for collecting the accounts not satisfactory.

Mr. *Walter Darley* said that about four years ago he built some houses and instituted gas-fittings. The gas-main ran alongside the houses; and although he made two applications to the Company to have them connected, nothing was done in the matter.

Mr. *E. H. Stevenson* stated that the works of the Company were considerably in excess of the requirements, and sufficient to supply the demands for many years to come. During the last ten years, the growth of the Company had only been at the rate of 3 per cent. per annum, and in the past five years at only 1 per cent. per annum. In Yorkshire, the general proportion of consumers was something over 80 per cent. of the houses in a district; but in the present case, it was only 44 per cent. In his opinion, this showed that the Company had not popularized their gas, and at the same time there had been a decrease in the sales in recent years. This meant that, as they were not increasing the amount of gas sold, they were unable to provide it at cheaper and reduced rates. During the past ten years, the capital employed had increased from about £650 per million cubic feet of gas sold to £900. The greatest quantity of gas made by the Company in a day was 220,000 cubic feet. The works consisted of 79 retorts, only 43 of which were in use last winter. This meant that there were always 36 retorts which were unnecessary during the greater part of the year. Since the works were beyond the requirements, the capital expenditure had been in excess of what was necessary. A barrier had therefore been placed between the consumer and cheap gas. A good deal of the expenditure of the last few years was due to the purchase of lands; and yet when the Company came to Parliament in 1873, they had more than 3 acres, and not one-half, or perhaps one-third, was built over.

Friday, June 6.

Mr. *Stevenson* to-day continued his evidence; and in reference to his previous statement that the Company had unnecessary lands, he produced a plan of the works, and made an explanation on the subject. He said that their object in purchasing more land was to make a new entrance; but, as a matter of fact, the entrance had never been made, and the old one was still in use. On the question of surplus retorts, he said that the cost of the retorts meant that money had been uselessly spent; and in case the business extended, so that eventually they did want more retorts, by the time they were required they would be out of date. The make by these retorts was about 5000 cubic feet per day, which was a low production from Yorkshire coal. Some of the retorts were small, and were fired by furnaces directly underneath them. On an average, the make was 6000 cubic feet of gas per day. Even taking this average, the Company would only require 37 of the retorts. Their condenser was of the vertical type, and was quite equal to a make of 400,000 to 500,000 cubic feet per day. The scrubber was 45 feet in height, and was capable of dealing with 500,000 feet of gas per day. The only criticism he made upon it was that the proportion of the area to the height was not particularly good. Taking the figure of 500,000 feet per day, this was more than double the maximum amount of gas they had ever made. He did not know of any other instance of a circular scrubber with a staircase round it; and he did not know of a scrubber with an iron circular staircase being enclosed in a brick tower. In the present case, the staircase was enclosed in brickwork some 2 feet or so from the scrubber; the staircase being between the brick wall and the scrubber. It had been said that such an arrangement might have some effect in regulating the temperature; but he did not agree with this. There were two exhausters, one of which was equal to 228,000 cubic feet per day, and the other to 360,000 cubic feet. This gave a total of 600,000 feet, whereas the output was 220,000 feet only.

The meter was also equal to a great deal more than the maximum output; and the purifier was much larger than was needed. All this went to show that the works were in excess of the requirements. The proposition had been put forward by the Company in their petition in the other House that they had spent a considerable amount of capital out of revenue. This meant that they had been expending money which ought to have gone towards the reduction of the price of gas. In the first instance, the Directors of the Company might be regarded as trustees for the shareholders; but as soon as they were paying maximum dividends, they became trustees to the consumers alone. If the reserve fund was full up, the price of gas must be reduced. But so long as a company did not fill up the reserve fund, or invest, there was no power to compel them to reduce the price. The capital of the Company was £32,000 in shares, and £8000 on loan. In the year 1895, the capital expenditure was moderate; being at the rate of £655 per million cubic feet of gas made. But in the last ten years, it had risen to £984 per million; and there had been nothing in the history of the Company to justify this rise in the capital expenditure. The tendency really ought to be that, as a business increased, and as the sale of gas grew higher, the relative amount of capital expenditure should fall rather than rise. It therefore followed, from the state of things they found in the present case, that sums of money had been uselessly expended. He also found that during the past ten years gas companies generally had been increasing their business; but the Pontefract Company had increased very little. The interest on the mortgages appeared to have been paid free of income-tax; and the amount of dividend paid was equal to 1s. 5d. per 1000 feet of gas sold. He should say that the rate of capital per million cubic feet of gas should not be more than £600. If this had been the amount of capital expended, the result would have been that, in place of the Company having to pay nearly £3000, they would have had to pay just over £2062. It was perfectly clear that if in ten years they had increased the amount of capital to £904 per million feet of gas sold, they must have spent money very injudiciously. In his judgment, all these facts justified the action of the Corporation and the wishes of the people in desiring to have these matters in their own hands. If the Corporation had charge of the undertaking, they would be more careful what amount was spent for capital purposes. In the other House, Mr. Corbet Woodall had said that the promoters had not provided satisfactory clauses in the Bill with reference to arbitration; but so far as he (witness) knew, the clauses were reasonable. Clause 26 of the Bill provided that—

> If within three months after the passing of this Act the Corporation shall give to the Company notice in writing of their intention to purchase the undertaking of the Company, the Company shall sell to the Corporation, and the Corporation shall purchase, the undertaking of the Company free from encumbrances for such price or consideration being a sum in gross, and on and subject to such terms and conditions as may be agreed upon between the Company and the Corporation or, as failing agreement, shall be determined by the arbitration of a single arbitrator under, and pursuant to, the provisions of the Lands Clauses Acts, such arbitrator to be agreed upon by the Company and the Corporation or, failing such agreement, to be appointed by the Board of Trade upon the application of either party; and in the construction of those Acts for the purposes of this section, the Corporation shall be deemed to be "the promoters of the undertaking," and the undertaking of the Company shall be deemed to be "lands taken or required for the undertaking," provided that in the event of arbitration neither party shall be represented by more than one Counsel or be at liberty to call before the arbitrator more than one engineer and one accountant as expert witnesses, in addition to any officers in the regular employment of the parties respectively.

In recent years the practice of Parliament had been to transfer these undertakings to the local authorities; and there was hardly any case that he knew of where the proposal had been rejected. On the other hand, there were numerous instances in which both the company and the local authority had been before Parliament, and even where there had been no complaints of misconduct of the undertaking. If it was to be said, as had been said in the other House, that the Local Authority should wait until the Company came to Parliament, and then raise their question, this would mean that the Company might keep out of Parliament for any length of time—even for 80 years, just as they had kept out for 33 years.

In cross-examination by Mr. LANKESTER, witness denied that most of the allegations against the Company of mismanagement were a matter of opinion. He thought it was distinct mismanagement on the part of the Company that they should have a capital of £900 per million cubic feet of gas sold, as against £655 ten years ago. He also declared that the expenditure on the enlarged plant of the Company was mismanagement; and it was further mismanagement when they purchased new land on which to place No. 3 gasholder, instead of putting it on the land they had in their possession.

In reply to Mr. WEDDERBURN, witness said that it was desirable in the case of a company to have a standard price of gas in order to give them a motive for cheapening the gas and increasing their dividends. On the other hand, there was no such proposal in the present Bill, because the undertaking would be transferred to the Local Authority, who were interested both for the consumer and the ratepayer.

Mr. *John Wilkinson*, the Gas Engineer to the Halifax Corporation, said that he had visited the works of the Company, and they were in excess of the average works of Yorkshire gas companies. The carbonizing results obtained had been very bad; and for ten years the Company had practically been going backwards. At one time the quantity of gas sold per ton of coal carbonized was 9368 cubic feet; but it had been reduced to 8643 and 8230 cubic feet. The reason for this was that the management of the Company was not what it ought to have been. In the first place, there was a loss of income; secondly, the gas was not sufficiently purified; and thirdly, the undertaking was not at all well managed. If the works had been better managed, there would have been a considerable reduction in the price of gas.

In reply to Mr. LANKESTER, witness admitted that the results from the carbonizing of gas depended upon whether the quality of the coal was varied.

Evidence was then called for the opposition.

Alderman *Thomas Wordsworth*, a Director of the Company, said that, so far as he knew, there had been no complaints against the Company. There had been no representation in any Council meeting of complaints, and none had been made at any meetings of Directors. He had heard no desire for the transfer until the matter was brought forward last year. When the Directors met the representatives of the Corporation, they (the Directors) said they could do nothing without the opinion of the shareholders.

Asked by the CHAIRMAN why nothing was done in the matter at any meeting of the directorate, witness said they thought it would be time enough to consult with the shareholders when they saw the Bill was going to be promoted. A ratepayers' meeting was held at which the majority of those present expressed themselves in favour of the Bill. A shareholders' meeting followed, at which it was decided to oppose the measure. The Directors had no power to negotiate terms with the Corporation until the Bill was passed. There were about 82 shareholders; but it was quite untrue that the Directors had any power to quote terms on account of the number of shares held by them. The matter had only been discussed as friends would discuss it, and as a matter of public interest. Every Director was paid a fee of £16 a year. If the undertaking was taken over by the Corporation at a reasonable figure, there was no prospect of a reduction in the price of gas, especially when the promoters were asking for power to spend money on the works. If he thought it was the wish of the people to have the undertaking given over to the Corporation, he would waive his objection. It was simply a question of a few members of the Council having a personal feeling against the Company.

Replying to questions by Mr. WEDDERBURN, witness said that, so far as he knew, the price of gas had been reduced. He did not remember one occasion when the town was thrown into darkness on account of the failure of the supply. He was quite convinced that, if the ratepayers had known anything like the amount of money the works were worth, they would not have voted in favour of the proposal. At the ratepayers' meeting Mr. Haddock said that similar works had been purchased for £53,000, and that £80,000 was a ridiculous price.

Mr. *Taylor*, who stated that he had been connected with the Company ever sinee 1832, told the Committee that in that year it was a non-statutory Company. In 1873, a limited liability Company was formed, with a capital of £16,000, made up of 1600 £10 shares. In 1873, the limited Company was dissolved by Act of Parliament, and the present Company was constituted. The share capital of the Company was £32,000. Of this amount, £16,000 was 10 per cent. and £16,000 7 per cent. capital. They also had power to raise on mortgage a sum of £8000—£4000 in respect of each £16,000; and of the £8000, they had actually so far raised £5000. Some of this had been obtained at 3½ per cent. and some at 3¾ per cent.; so that they still had power to raise £3000 on mortgage. They also had authority to convert their mortgages bearing 3½ and 3¾ per cent. into ordinary or preference shares bearing 5 per cent. under the terms of the Act of 1873. It was not accurate to say that the Company were at the end of their tether. Their reserve fund was over £2000, and they had the right to increase it until it was over £3000; so that they could continue for a good many years yet without applying to Parliament. They would not have to come to Parliament to increase the size of their works. The only expenditure of a capital nature that they needed to expect was in mains. They could not buy a smaller piece of land than was purchased by them; and at the time the land was taken over, they were either compelled to buy it or let it go altogether. The land was 2½ acres, for which they paid something like £2000. It was acquired in order to make a new approach—which had been laid down—to the works, because two carts could not pass along the road. Being situated in the middle of the town, the land would become more valuable. It was near to the Lancashire and Yorkshire Railway. The limits for supply by the Act of 1873 included the whole of Pontefract and the parish of Carleton. The number of consumers ran into hundreds, and was increasing. Some of their shares were 10 per cent.; and the reason why they were not often on the market was because they did not want to sell them. When sold, they realized as much as £28 each; and for the 7 per cent. shares about £22 10s. As a body, the shareholders were not willing to sell their undertaking.

The Committee adjourned until yesterday (Monday), when the evidence of Mr Corbet Woodall completed the case for the opponents of the Bill.

Blyth Water-Works Purchase Scheme.

A Local Government Board inquiry was held a few days ago at Blyth, with regard to the application of the Urban District Council for sanction to the borrowing of £14,500 to enable them to purchase the local water-works from Lord Ridley, to whom they belong. The Clerk (Mr. T. R. Guthrie) said that the present works were established about 1864; the supply being taken from an old quarry wherein were several good springs. But many years ago, owing to underground workings or other causes, these springs ceased to exist, and water was now partly taken from Meggie's Burn, from land fertilized by town manure, and partly from Shankhouse Pit. In 1887 and 1893, the supply partially failed. The Local Authority had long felt it a duty to become the owners of the water-works, and had frequently attempted to purchase them; the object being to get a more reliable supply. In 1899, the water was so unsatisfactory that negotiations were re-opened; and eventually a Committee met the late Lord Ridley, who agreed to dispose of the works on very generous terms, provided he was satisfied that the Council obtained a better supply. In 1894, the Newcastle and Gateshead Water Company promoted a Bill in Parliament, which included Blyth in the area of supply; and the Council considered the time opportune to purchase the Blyth works, so that the town might be supplied with Newcastle water. It was really the plant they were going to acquire, and Lord Ridley's interest in the works. Property owners were bound by a covenant in their deeds to take water from Lord Ridley; and in order to get these customers, it was necessary to purchase Lord Ridley's interest in the undertaking. It was intended to keep Lord Ridley's supply as a standby, in case of failure of the Newcastle supply. The price agreed upon is £8800.

WOLSTANTON GAS BILL.

House of Commons Committee.—Thursday, July 5.

(*Before Mr.* J. J. MOONEY, *Chairman, Mr.* A. L. LEVER, *and Mr.* J. S. FLETCHER.)

This was a Bill by which the Wolstanton Urban District Council sought authority to acquire the undertaking of the Chesterton Gas Company, and to carry out certain projects.

Mr. HONORATUS LLOYD, K.C., and Mr. C. C. HUTCHINSON appeared for the promoters; Mr. WEDDERBURN, K.C., and Mr. F. N. KEEN represented the Newcastle-under-Lyme Corporation; the Hon. J. D. FITZGERALD, K.C., and Mr. FLEETWOOD PRITCHARD the Burslem Corporation; and Mr. RAM, K.C., and Mr. R. S. CLEASE, Mr. H. G. Ball and others.

Mr. LLOYD, in opening, said that, shortly, the object of the Bill was to enable the Urban District Council of Wolstanton to supply their own district with gas. It seemed a fairly inconsiderable matter in itself; but certain difficulties arose in consequence of the conditions of the supply of gas at the present moment. The urban district was only recently formed by a combination of the three parishes of Wolstanton, Silverdale, and Chesterton. In Chesterton there was a supply from a limited liability Company with no statutory rights; and the other portions were supplied by the Newcastle-under-Lyme and the Burslem Corporations. The population of the urban district was 23,000; its rateable value about £93,000; and the outstanding loans £16,366, with an area of 5483 acres. In parts of the district they had no public lighting at all. As soon as the Council was formed, in 1904, the matter came up for discussion upon the Council itself; and the result was that they determined to take the advice of Mr. Corbet Woodall. The supplies which were now in the hands of the Newcastle and the Burslem Corporations were, prior to the year 1877, both in the hands of statutory Gas Companies. In 1877, however, two Acts of Parliament were passed transferring one district of supply to the Newcastle Corporation and the other to the Burslem Local Board, as it then was. At that time, it was seen that, inasmuch as each of the districts was supplied by a Company, and that the Companies' limits extended not only to the limits of the Local Authority, but beyond them, a question probably would arise in time to come when the outside districts beyond the limits of the respective Corporations would become urban authorities and would desire to supply themselves. Consequently, each of the Local Authorities had put upon them a provision to the effect that if and when an outside authority desired to supply themselves, and were authorized to do so, the Corporation should sell their mains, pipes, and fittings outside their district and in the limits of the new authority. In the Bill, they provided that, if Parliament authorized them to undertake to supply gas in their own district, they should buy, and the Corporations should sell respectively, the mains, pipes, and fittings in their district. The gas-works proper were, of course, in their own districts; but they had mains for the purposes of supply in parts of the Council's area. In the Bill the Council said that, when they had bought these mains, pipes, and fittings, the Corporations' powers and obligations in the district should cease; and the Corporations said—and this was really the *crux* of the whole question—"When Parliament said that you should be at liberty, when authorized to supply gas, to buy our mains, pipes, and fittings, Parliament never intended that those outside should stop supplying." "Therefore," said they, "although Parliament said that if you were authorized to supply yourselves, you might set up gas-works, and you might buy our pipes and mains in your district, they never intended that we should not go on to lay mains alongside you as soon as you have done it." He (Mr. Lloyd) could not bring himself to that frame of mind. They were faced with this, that two Corporations came and contended that Parliament literally intended, when they said that he might buy their mains, &c., that their powers and obligations should continue, and that, as soon as he had bought their pipes, &c., they should lay fresh ones alongside, and that, after he had the power to put down these mains, they should lay fresh ones and go on *ad infinitum;* the only limits being, he supposed, the space in which mains might be laid and his purse for buying them up when laid. He could not believe that Parliament intended at any period such a wilful waste of public money. This was really the point as raised by the Corporations. There was another petition by certain gentlemen who were gas consumers. They did not appear in the other House; and he understood their fear was this: They said they were supplied to-day satisfactorily; that if the Council undertook to supply them in the district, they would do it at a loss, and therefore it would fall upon them as ratepayers; or, in other words, they thought that either the supply of gas from the Wolstanton Council would be at a higher price to them, or, if it was at the same or a lower price, it would still fall upon them as contributors to the loss *qua* ratepayers. But the answer to this was that here, as soon as they were on their legs, there was no reason why they should not be supplied at exactly the same price as to-day, but at a considerable profit to the ratepayers of the district. Chesterton was supplied by the limited liability Company at 4s. per 1000 cubic feet, less 3d. discount, or 3s. 9d. net; Burslem's portion was supplied by the Corporation at 2s. 8d., less 2d. discount, or 2s. 6d. net; and Newcastle's portion was supplied at 3s. 4d., less 6d. discount—there having been a drop of 2d. during the last few months. They proposed to construct their works on the site which was now occupied by the Company in Chesterton, which was central to the district, and was a very good site for the purpose. By clause 24 of the Bill, it was proposed that the maximum price should be 4s. per 1000 cubic feet, as against 4s. at Burslem and 4s. 3d. at Newcastle. It was further proposed to authorize the District Council to borrow £29,600 for the purchase of the gas-works of the Company, for the extension and improvement thereof, and for working capital, in addition to the sums requisite for the purchase of the mains, pipes, and fittings of the Burslem and Newcastle Corporations in the district, and for paying the costs of promoting the Bill; and also (with the approval of the Local Government Board) to borrow such further money as the District Council might require for any of the purposes of their gas undertaking. In order to secure the repayment of the money so borrowed, and the payment of the interest thereon, the District Council sought power to mortgage or charge not only the revenue of their gas undertaking, but, as a collateral security, the district fund and general district rate of the entire district.

Mr. *Edward Hollingshead*, the Clerk to the Urban District Council of Wolstanton, having given evidence,

Mr. *Corbet Woodall* was then called. He said that the Chesterton Company had conducted their work in a very inefficient manner. The public streets had not been lighted at all, and he believed in the last year or so the reason given had been that the works were not large enough to produce the gas for public lighting. The amount agreed to be given for the works was £2600. He gave a little less figure in the other House; but he considered this was a fair sum to pay for the undertaking. The actual amount of gas sold in Chesterton by the Company had been about 3 million cubic feet; and he had advised the Urban District Council that, if they took over the works, the amount would treble in the course of two or three years. The position was a central one. He was familiar with the sections in the Burslem and Newcastle Acts which provided for the sale of the mains, pipes, and fittings; and he believed that such a clause was universal to-day. The maximum price in the Bill was 4s. per 1000 cubic feet; but he did not suppose for a moment that this would be the price actually charged by the Council. The capital they asked for was £26,000 for the gas-works; a sum requisite for the purchase of mains, pipes, and fittings to be agreed or settled by arbitration; and they wanted £25,000 for the extension and improvement of the gas-works of the Council. The amount of gas supplied now in the district by the three bodies was 44 million cubic feet; and he estimated that, under the new conditions, it would be 50 millions. His estimates were sufficient to provide for such a supply. The site at Chesterton was a good one. The works were close to an excellent gas-coal pit, and within easy reach of all collieries working gas coals in North Staffordshire. There was a fear expressed by opponents that the price of gas would be higher; but he should be surprised if after the second year they were not supplying it at 2s. 6d. The business would be a growing supply; and as it grew the cost would be reduced. They would be able not only to supply at an equally low rate as their neighbours, but also make a profit out of it. His estimate showed that they ought to supply gas in Wolstanton immediately at 2s. 6d. per 1000 cubic feet.

By Mr. RAM: He denied that the Chesterton works were no good. He really did not know the age of the mains; but he should think most of them were 30 years old. The Council proposed to utilize them; but they would examine them carefully and put them right if any of them were bad.

In reply to Mr. FITZGERALD, witness said he did not consider 4s. an extravagant maximum to fix; it was the same as Burslem. He cared very little about maximum prices; the interest of the undertaking was so much in the direction of keeping down the price that they did not need the maximum to help them much. He estimated that the profit of the Burslem Corporation in the Wolstanton district was £1460 a year; but he declined to accept the statement that taking away this amount of profit from the undertaking would either oblige the Burslem people to increase their prices so as to keep up the profit, or that it retarded the period when they could make a reduction in the price. It simply reduced for a time the amount which they were taking from the profits of the gas undertaking in aid of the rates.

Captain *J. H. E. Heathcote*, J.P., a member of the Wolstanton School Board and Vice-Chairman of the Chesterton Gaslight Company, said the Company had agreed to dispose of their undertaking to the Council. He thought the price a bad one; but he considered the lighting should be in the hands of the Local Authority.

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Mr. *Mears*, the first Chairman of the Wolstanton Council, said that in promoting the Bill the Council were undoubtedly carrying out the wishes of the Chesterton section at all events.

Mr. *J. Leach* and Mr. *Somnel* also gave local evidence in favour of the Bill.

This concluded the case for the promoters.

Mr RAM then called evidence in support of the opposition of gas consumers.

Mr. *H. G. Ball*, a Wolstanton ratepayer and gas consumer, said he was satisfied with the gas supplied to him, and with the price. It was supplied by the Burslem Corporation. He objected to the Bill because he was afraid he would have to pay more for his gas. As to the feeling in the district, so far as he could judge there was an overwhelming majority against the Bill.

Mr. *A. Brooke*, also a Wolstanton ratepayer and gas consumer, said he objected to the Bill because he thought it was against the interests of Wolstanton. They were only a newly-formed Council, and he thought they had plenty of work to do to put their house in order. He considered the price was reasonable; they were very well satisfied with 2s. 6d. per 1000 cubic feet. The feeling of the district was very much against the Bill; and he had not found one person in Wolstanton in favour of it except the councillors themselves. Chesterton no doubt was in need of a better supply of gas—the present supply was bad and dear; but they did not want the other parts of the district to pay for the gas which Chesterton would consume. He thought it would be a great mistake for a young Council to purchase a great gas-works when they had to go in for sewage, and education, and so on.

Mr. *R. T. Grocott*, Mr. *W. H. Cook*, and Mr. *Guilford* gave corroborative evidence.

Mr. *W. A. M. Valon*, examined by Mr. RAM, said he agreed that the gas supply at Chesterton was very bad. With regard to the works, for which £2600 was going to be paid, for the purpose of supply of the whole district (including Chesterton) they were of no value whatever, excepting the land and a house. The works themselves must necessarily be scrapped. The site was a bad one from the points of view of canal and railway siding accommodation; and he considered it was an expensive matter having to "handle" the coal instead of taking it straight into the works. There was no doubt—in his mind, at any rate—that the scheme proposed by the Urban District Council of Wolstanton meant that the

consumers must pay considerably more for gas than they were doing at the present time.

In answer to Mr. FITZGERALD, witness said that the works of the Burslem Corporation had been enlarged during the last year or so for the purpose of providing for the supposed extra demand for gas in Wolstanton and district. It followed that the capital which had been spent in this way would be entirely wasted for the present.

Examined by Mr. KEEN, witness said that, if the Bill was passed, Newcastle would be left with a large margin of works without an increasing sale in their own area to use it up. In addition to this, when the undertaking was taken over there was a price paid for goodwill; and it seemed to him to be quite unfair that the burden of the cost of the goodwill should be borne by the whole area of supply taken over. He did not think it was a just thing that the loss due to severance should fall upon Newcastle.

Mr. LLOYD (in cross-examination): Do you suggest that, if we exercise the power given us by Parliament, it would be right, proper, or decent that the Corporations should then lay mains alongside?

Witness: I think that a person can take every legitimate means, and he is quite right to take any legitimate means he can to protect his own property.

I have given you the effect of the two sections of the Acts of 1877, with which you agree. Now I ask you, if that is the effect, do you think it would be a right or proper thing that the Corporations, or either of them, should then go and lay mains alongside the mains that I have just purchased?—I have already said that the position, of course, is a ridiculous one; but it does not lie with the Corporation of Burslem or the Corporation of Newcastle to get rid of the difficulty. It remains with you. You have disturbed us; you come and ask us to vacate our district; you try to put pressure upon us to make us do it.

Continuing, witness said that when the draftsmen used the word "mains," he believed sincerely that it was thought that it was sufficient to protect the interests of the Corporations.

After Counsel had been heard, the room was cleared; and then the Committee found the preamble of the Bill proved.

On clauses, Mr. FITZGERALD asked the Committee to strike out the proviso to sub-section 1, clause 9, which says: "Provided all rights, powers, and obligations of the Burslem Corporation to supply gas within the district shall cease and determine." He said that the least that could be done was to leave the Corporation of Burslem in the position in which the Act of 1877 left them.

Mr. WEDDERBURN, for Newcastle, adopted his friends' arguments with regard to clause 10.

The CHAIRMAN: The Committee are of opinion that the decision which they have given covered both these clauses. They gave their decision on the grounds that they are now to constitute a new gas authority for this district; and that your right to supply over the mains in that district must cease when the new authority is constituted.

Mr. WEDDERBURN and Mr. FITZGERALD then asked for a clause providing that if the boundaries of their boroughs were at any time extended so as to take in a portion of the district, Wolstanton should sell the mains, pipes, and other gas-works in the area so added.

Mr. HUTCHINSON replied that sufficient for the day was the evil thereof; and when the case arose, they would be prepared to answer it.

The CHAIRMAN said the Committee could not accept the clauses.

Other clauses having been adjusted, the Chairman was directed to report the Bill to the House.

UNOPPOSED BILLS.

Lord ONSLOW, the Lord Chairman of Committees of the House of Lords, had the following Bills before him last Tuesday.

Derby Gas Bill.

By this Bill it is proposed to extend the limits of supply of the Derby Gaslight and Coke Company, to enable the Company to acquire the undertakings of the Spondon, Ockbrook, and Borrowash Gaslight and Coke Company, Limited, and the Mickleover and Etwall Gaslight and Coke Company, Limited, and for other purposes.

Some questions arose with regard to the settlement of clauses between the Draycott Gas Company and the promoters; and the Bill was adjourned in order that the clauses might be adjusted.

Cheltenham Gas Bill.

This Bill, which proposes to confer further powers upon the Cheltenham Gaslight and Coke Company, and to make further provision with reference to their undertaking, was ordered to be reported, with amendments. These related mainly to testing for pressure; and they occurred in the following clause, which was agreed to:—

1.—From and after the passing of this Act, the prescribed pressure in the mains of the Company shall be not less than 10-10ths of an inch head of water at the junction therewith of the service-pipes supplying the respective consumers.

2.—The test for the pressure of the gas supplied by the Company may be taken by the gas examiner without previous notice to the Company at the top of the lamp-posts of the public lamps as hereinafter provided at the level of the burner of such lamps; and for the purpose of making such tests the gas examiner shall remove the governor or self-acting regulator (as the case may be) and burner of any public lamp used for street lighting.

3.—For the purpose of testing the pressure of gas supplied by the Company, the gas examiner shall connect a self-registering pressure-gauge to the lamp-cock by a flexible or other suitable pipe, which shall be gas-tight; and such pressure-gauge shall be as nearly as practicable at the same level as the lamp-cock.

4.—One-tenth of an inch shall be deducted from the registered pressure to allow for the difference between the pressure of gas at the top of the lamp-column and that at which it is supplied in the street-main.

5.—Forthwith after making any such test, whether the same shall reveal any deficiency in the pressure of the gas or not, the gas examiner shall give notice of the making of such test to the Company, stating the time and the position of the lamp at which such test was made and the result of such test.

Peterborough Gas Bill.

This Bill has for its object the consolidation of the capital of the Peterborough Gas Company, for enabling them to acquire additional lands and to raise further capital, and for other purposes. The Bill was ordered to be reported. After the Bill left the House of Commons, the testing provisions were altered by agreement with the Corporation, and the following new clause was inserted:—

From and after the passing of this Act, the following provisions shall have effect.

1.—The prescribed number of candles shall be fourteen.

2.—Notwithstanding the provisions of Schedule A to the Gas-Works Clauses Act, 1871, the photometer to be employed for testing the illuminating power of the gas supplied by the Company shall be that known as the table photometer, and in lieu of candles there shall be used the lamp known as Harcourt's ten-candle pentane lamp, or such other photometer and standard light as may be prescribed for use in testing the illuminating power of gas for which the prescribed number of candles is fourteen by the Notification for the time being in force of the Gas Referees appointed in pursuance of the City of London Gas Act, 1868.

3.—(*a*) The prescribed burner shall be the "Metropolitan" argand burner No. 2, or such other burner as may be prescribed by the said Notification; and in making any test of the gas supplied by the Company, the burner shall be used in such a manner as to obtain from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light, and the burner shall be used in the mode prescribed in the said Notification. (*b*) The pentane to be used in testing shall be of the quality prescribed in the said Notification.

4.—The Company shall not be liable to any penalty or forfeiture in respect of any deficiency in the illuminating power of the gas supplied by them unless the average of three consecutive tests made in any one day at intervals of not less than one hour shall be less than the prescribed illuminating power.

5.—The Company and the Mayor, Aldermen, and Burgesses of the Borough of Peterborough may from time to time agree upon any regulation with reference to the testing of the gas supplied by the Company in addition to, or in substitution for, any provision contained in the said Notification; and any regulation so agreed upon, if approved by the Board of Trade, shall apply accordingly.

South Suburban Gas Bill.

Further provision is sought in this Bill with reference to the gas supplied by the South Suburban Gas Company, and the price to be charged therefor. The Bill was passed by the Committee.

Clause 2 provides that the standard price and sliding-scale of the Act of 1904 be repealed, and that the standard price to be charged by the Company for gas supplied by them shall be 2s. 9d. per 1000 cubic feet.

Clause 3 provides that:

1.—(*a*) The prescribed number of candles shall be fourteen: Provided that notwithstanding anything contained in the said Gas-Works Clauses Act, 1871, or any other Act relating to the Company if the illuminating power of the gas supplied by the Company shall be below such prescribed number of candles to an extent not exceeding half-a-candle the Company shall not be liable to any penalty in respect of such deficiency; and that if such illuminating power shall be below such prescribed number of candles to an extent exceeding half-a-candle but not exceeding one candle, the penalty to which the Company shall be liable in respect of such deficiency shall be not exceeding five pounds:

(*b*) The burner to be used for testing the illuminating power of the gas shall be that known as the "Metropolitan argand burner No. 2," or such other burner as may be for the time being approved for the purpose by the Board of Trade on the application of the Company or the local authority of any district within the limits of supply of the Company: Provided that any such other burner as aforesaid shall be of such a pattern (not being an incandescent or similar burner) as shall be practicable for use by the consumer and shall with the chimney (if any) to be used therewith be the most suitable for obtaining from the gas when consumed at the rate of 5 cubic feet an hour the greatest amount of light: Provided also that the said Metropolitan argand burner No. 2, or such other burner as aforesaid, shall, in making the test, be so used as to obtain from the gas when consumed at the rate aforesaid the greatest amount of light:

(*c*) The standard for measuring the illuminating power of the gas supplied by the Company shall be Harcourt's standard pentane ten-candle lamp, which shall be used with an open bar photometer:

(*d*) The gas under examination shall be kept burning at the said rate of 5 cubic feet an hour for at least thirty minutes before any testing is made.

2.—In testing the illuminating power of the gas supplied by the Company, it shall not be necessary to apply more than a single test.

The Unopposed Committee of the House of Commons, presided over by Mr. CALDWELL, had the following Bills before them on Thursday.

Cumberland Electricity and Power Gas Bill.

This Bill provides, among other things, "that the Company may generate, use, sell, supply, and distribute electrical energy, and manufacture, prepare, use, supply, sell, and distribute power gas, and manufacture, sell, and deal in any bye-products or residuals of power gas." The capital is put at £450,000, in £10 shares, with an additional £150,000 borrowing powers.

Sir CHANDOS LEIGH: You ask for power to pay interest? Do you expect to get subscriptions locally?

Mr. JOHNSON (Messrs. Torr and Co.): Yes; we are relying almost entirely on local support.

A MEMBER OF THE COMMITTEE: When do you reasonably expect to pay interest on the capital?

Mr. JOHNSON: I think we ought to be able to do so in about two or three years.

The Bill was ordered to be reported.

Glamorgan and South Wales Water Bill.

By this Bill it is proposed "to empower the Glamorgan County Council to make inquiries and surveys with a view to the utilization of water supplies in South Wales, and for other purposes."

The Bill was ordered to be reported.

SUTTON DISTRICT WATER BILL.

House of Commons Committee.—Tuesday, July 3.

(*Before Mr.* MOONEY, *Chairman, Mr.* BRUNNER, *and Mr.* LEVER.)

This Bill, which is "for the preservation of the sources of water supply of the Sutton District Water Company and for other purposes," was promoted by the Company under circumstances which were explained in the "JOURNAL" for the 17th of April last (p. 161). The Bill was out of time; but the Standing Orders Committee considered that the proposals contained in it were of sufficient importance to justify them in allowing it to proceed. Moreover, as recorded in our "Parliamentary Intelligence" from time to time, several petitions were presented in its favour. There were, however, some opponents, the principal being the Brighton and South-Coast Railway Company.

The Hon. J. D. FITZGERALD, K.C., Mr. LAILEY, and Mr. BIDDER appeared for the promoters; Mr. FREEMAN, K.C., Mr. MOON, K.C., and Mr. CLODE represented the Railway Company.

Mr. FITZGERALD, in opening, said that the Bill was promoted by the Sutton Water Company for the preservation of their sources of water supply; and by doing this they would also protect the springs which were the sources of the Rivers Wandle and Hoggsmill, which springs rose within the Company's district. The cause of the promotion of the Bill was the action of the London, Brighton, and South Coast Railway Company, who, without statutory authority, were sinking a deep well at no great distance from the Water Company's existing well and from the springs at Carshalton which gave rise to the Wandle. By this well, the Railway Company proposed to supply large works of their own, and use the water for their general purposes altogether outside the district. The pumping of water from the well, if carried on to a large extent, as it undoubtedly would be, would inevitably affect the supply of the district and also the Carshalton springs. The Bill was a very short one, and simply set forth that water should not be taken for sale or use outside the district, except by the authority of Parliament. That was to say, that anyone who desired to construct works for the purpose of taking water out of the district should be obliged to go to Parliament for the necessary authority, when all parties could be heard, and the interests of those who were in possession could be properly protected. The principle on which the Bill was based had been recognized by Parliament in many cases, and it was this—that where the water supply of a district was in the hands of a company incorporated by Parliament for the purpose, as long as the company did their duty (as the Sutton Company had done), and supplied pure and wholesome water in their district, their works were not to be prejudicially affected, or possibly rendered useless, without the sanction of Parliament. In numerous cases within recent years the Legislature had acted on this principle, and had refused to allow deep adits to be made, even for the purposes of securing a public supply, when the effect would be to injuriously affect existing wells which had been duly authorized. The Sutton Water Company was originally established in 1863 as a limited liability undertaking; the intention of the promoters being to supply the town and the adjoining district. In the year 1871, they applied for parliamentary powers, with the usual obligations; and their limits of supply were fixed by the Act then obtained. They included the town and parish of Sutton, and a large surrounding area. It was a favourite residential district, and was rapidly increasing in population. In 1871, it was 20,000; at the last census, it had risen to 48,000; and now it was estimated at 57,000. Of this population no less than 53,000 were dependent for their water supply on the Company's works, which consisted of a well and a pumping-station; and the Company were authorized to sink an additional well and construct another pumping-station, which were not yet complete. It was from the chalk formation that the Company drew their supply. At certain points the water came to the surface in very large springs; and it was from these that the Wandle was formed. When a well was sunk into the chalk, and the water was pumped from it, it took the water from a considerable area round about; and it was obvious that another well in the immediate vicinity of an existing one would exhaust a considerable portion of its supply. The quantity of water pumped by the Company in any one day had risen from 1,190,000 gallons in 1891 to 2,500,000 gallons in 1904 and 1905; and where a company were supplying a district by pumping from wells, and had no storage reservoir, it was for the maximum supply of any particular area that they must provide. It was as certain as anything could be that, if the Railway Company ran adits in both directions from their well, they would cut all the fissures by which the springs and wells received their principal supply, divert it from the Water Company's well, and diminish the bulk of the supply which some of the springs obtained at present. He had not the least doubt that the Railway Company had selected the particular site they had chosen for their well for the reason that the existence of the Water Company's well on one side and the Carshalton springs on the other showed them that in the region to the south of both of these supplies there was passing through the ground an ample supply of water which they would be able to strike. But the damage to the Water Company and to the riparian owners on the banks of the Wandle and Hoggsmill would be enormous.

Mr. CLODE (interposing) remarked that the Railway Company had limited themselves to six miles.

Mr. FITZGERALD said he would deal with this point later. The curious thing was that, under the existing state of the law, if the water had been above ground, the Railway Company could not have done legally what they were doing here. If they had put a pipe into the Wandle, and proposed to pump water from the river for use down the line, they would have been acting illegally, and could have been restrained by injunction by anyone interested in the flow of the river. But what the Company were relying upon was what was known as the legal doctrine relating to underground water—viz., that no one had any right in such water unless it was flowing in a defined and known channel; and that, accordingly, as no one had any property in it, no one could be prevented from taking it. In an ordinary case, the law of underground water caused no hardship at all; but it was an altogether different thing where a railway company or a public authority came into a district and sank wells from which they were going to pump several million gallons of water a day, not for an ordinary landowner's use on an estate, or for the supply of his house or anything of that sort, but for the purpose of supplying a large district elsewhere, or, as in the present case, for supplying large works which were quite outside the district. The exercise of the power arising from there being no property in underground water unless it flowed in a defined and known channel, enabled anyone to take the whole of the water in a district; and where, as in the present case, wells and works had been authorized by Parliament for the purpose of supplying the inhabitants, it would enable one to deprive them of their supply. In the majority of cases, however, this could not be done without the parties first coming to Parliament, because they required either power to take land compulsorily, or else to break up the highways; and therefore in most cases Parliament had been in the habit of seeing that existing interests were properly protected. When this question first arose, owing to the decisions given in regard to underground water, objection was formally taken before the Court of Referees that there was *locus standi;* and the Court of Referees had so decided in several cases. They considered that, however hard it was, they were bound to so rule, owing to the definition which had been given of the law, unless, as sometimes happened, there was some other reason, like taking a piece of land, which gave a petitioner the right to be heard. Such manifest injustice was done, that the House itself intervened, and a few years ago a new Standing Order was passed for the very purpose of preventing these objections being taken in future, and for providing that, where the existing water supply was being interfered with, the persons entitled to that supply should be heard before a Committee on the Bill. The district in question had been the hunting-ground of promoters for many years; and it had only been by the vigorous action of the inhabitants that they had been successful in maintaining their water supply intact. Towards the close of last year, the Sutton Water Company ascertained that it was proposed by the Railway Company to sink the well in question, and they entered into communication with them; but, not being able to get any satisfactory assurance from them as to what they were doing, their only course was to promote a Bill. It was then too late to do so in the ordinary way; and accordingly they had to ask the leave of the Standing Orders Committee to deposit a late Bill. The question was of such importance that permission was given. Clause 3 of the Bill contained what was really the only provision, and it was as follows:

> From and after the passing of this Act, it shall not be lawful for any company, body, or person, except with the express authority of Parliament hereafter obtained, to convey by pipe or conduit, for sale or use beyond the area of supply, water taken from any well or watercourse within such area: Provided that nothing in this section contained shall take away (1) any right of any landowner (other than a railway company) to supply with water any part of his estate situate within, or partly within and partly without, the area of supply, or to construct works for that purpose; or (2) any right of any railway company to supply with water any station or stations within the area of supply, or to construct works for that purpose, or to use on any engine or carriage, without as well as within such area, water supplied at any such station or stations.

What was intended was to prevent the Brighton Company from erecting big water-works, and pumping a large quantity of water. The Sutton Company had the support of every local authority concerned. The Railway Company had an "omnibus" Bill pending this session; but it did not deal with this question at all. Therefore it could not be opposed on that ground. But, on the second reading of the Bill in the House of Commons, objection was taken by an honourable member, and Mr. Kearley said he was authorized by the Railway Company to say that they would not supply by means of the well any portion of their works at a greater radius than six miles. He (Mr. Fitzgerald) had no doubt the Railway Company intended to observe this condition; but it was not legally binding upon them. Independently of that, however, the undertaking was wholly insufficient for the purpose of protecting the district. There was no limitation as to the quantity of water the Company were to take. Within the radius named, which extended into the Administrative County of London, the Company had a large carriage-cleaning yard at Streatham. It was 20 acres in extent, and there were 34 stand-pipes laid, with mains, for the purpose of washing carriages; and the quantity of water that might be used was necessarily large. At present they obtained considerable supplies from the Metropolitan Water Board; and their object apparently was to get rid of paying for them, and use their own water instead. In addition to this, within the six-mile radius there were 43 stations of the Railway Company. Another matter of most serious import was that the Company were now beginning to electrify their suburban system. If they proceeded with the electrification of the whole of it, they would want a large generating-station of their own; and there was nothing to prevent them erecting it within the radius, and then they would be able to use an enormous quantity of water in this direction. This was simply done, as far as one could see, for the purpose of getting the water at a little lower rate than was now paid to the Metropolitan Water Board and the Croydon Corporation.

The following evidence was given in support of the Bill.

Mr. W. Vaux Graham, the Consulting Engineer to the promoters, examined by Mr. FITZGERALD, stated that he was familiar with the chalk area from which Sutton's water was drawn. The total area of supply was about 40 square miles. The Water Company were under the restriction that, whereas they were authorized by Parliament to maintain and continue the Sutton well, and sink another, they were forbidden to sink one on any other part of their property, and had to come to Parliament for powers to do so; and this was substantially the condition under which they desired to see the Railway Company placed. Asked if he had always been able to give a sufficient supply of water to the district, or if there had been times when the supply had been a subject of anxiety, witness said that in 1898 he proceeded to drive adits to get more water, and did the same thing four years later. Since then there had been no anxiety. If the wells were not interfered with, he saw no reason to doubt that the Company would be able to continue the supply. There was no doubt that their pumping affected

the Carshalton springs, and if the Railway Company pumped water from their new well it would seriously interfere with both the Sutton well and the springs. If they were to carry adits along their line, they would intercept some of the Water Company's supply, and some of the water going to the springs. The Bill was entirely a protective measure, and not aggressive in any way. The Railway Company would use a large quantity of water if they electrified their line and erected a generating-station within the six-mile radius; and one could not help being suspicious that there was something of the kind in prospect, because the quantity of water they used at present within that radius was not very great. During the previous week there had been considerable pumping going on at the Railway Company's well; and the effect had been to prove conclusively that they were robbing other springs in the district.

In cross-examination by Mr. FREEMAN, witness said he agreed that a landowner could sink a well on his own land and use the water obtained from it, and that the Railway Company were entitled by law to do this. But he maintained that their action in constructing a well within a few yards of another and proposing to take water on so large a scale as they would do, was unprecedented. His complaint was that the landowner in this case was going to take a very great quantity of water; but the Water Company wished to be reasonable. They did not want to prevent them supplying the stations within the Company's area, but to prevent them taking water in large quantities by conduit out of their district.

Wednesday, July 4.

On the resumption of the proceedings this morning, further evidence was given in support of the Bill.

Mr. *R. W. Wootten*, the Chairman of the Sutton Urban District Council, said the restriction which the Water Company sought certainly ought to be imposed.

Mr. *W. S. J. Brown* (a member of the District Council), Mr. *H. W. Parker* (the Chairman of the Carshalton Urban District Council), Mr. *D. M. Roberts* (of the Mitcham Leather Mills), Mr. *F. Palmer* (Wandsworth), and Mr. *A. D. Henderson* (Ewell) having been called,

Mr. *W. Whitaker*, F.G.S., said the distance between the Water Company's well and that of the Railway Company was less than 1000 yards, and he hardly thought this was a reasonably safe distance for the protection of the Water Company's works, presuming, of course, that a considerable quantity of water was pumped. The boring was a 2-feet one; and it was quite the right size if one wanted to get a lot of water. The water in the chalk in the Water Company's district was required for local consumption.

Mr. *G. R. Strachan* corroborated the statements of the preceding witness, and said the distance between the two wells was altogether too small. He thought it was essential that existing wells should be protected when new ones were being sunk. He considered it was not "playing fair" with the Sutton Company to make a well within so short a distance of their supply. He regarded the operations of the Railway Company as a very striking instance of the mischief which might be done if a company with their particular powers could have a free hand. If the Brighton Company were to systematically draw a million gallons of water a day from a new well, he had no doubt whatever that the effect would be disastrous upon the Sutton well. It would practically deplete it, if the Company put down sufficient plant on their property, and then drove headings under the railway towards the west.

Mr. MOON: Under the general law, a landowner has the right to sink a well as deep as he likes, and pump as much as he pleases?

Witness: I understand that to be the law.

Why should a railway company be in any different position to a landowner?—Because it is a creature of Parliament. It has certain powers given to it; and this happens to be quite a side-issue of one of the powers of the Railway Company. I do not wish that they should be prevented from getting water. What I desire is that they should come to Parliament and prove their necessity, prove that it will not affect anyone else, and have the sanction of Parliament to what they are doing.

Mr. *C. Burt*, a member of the Surrey County Council, and Mr. *W. W. Gale*, the Surveyor of the Carshalton Urban District Council, also gave evidence.

Mr. *C. L. Morgan*, the Chief Engineer of the Railway Company, was the first witness called for the opposition. He said that, under his supervision, a 24-inch bore had been sunk to a depth of 350 feet below the surface, on land belonging to the Company. The water stood in the boring at about 75 feet from the surface. They wanted water for the general purposes of their undertaking; and the spot selected was found to be a very suitable one for obtaining a good supply. He could not conceive it possible that the sinking would in any way affect the Water Company or the River Wandle. A good illustration of this was the fact that the contractors made a temporary boring 21 feet to the westward, and during the whole of the pumping operations and both the preliminary and 72-hour trials, they had not affected the level of the water in that bore to the extent of an inch. This was the first occasion on which any attempt had been made to restrict their rights as landowners to do this sort of thing. It was a very important matter from a railway company's point of view; and the only effect of it here was that it might create an ugly precedent for other purposes. Where they could get water from companies, the price was such that they wanted to get it at a cheaper rate. He was perfectly prepared to pledge his Company not to use the water except for their own purpose; and they had already undertaken not to do so beyond a six-mile radius.

In reply to Mr. FITZGERALD, witness said the Company did not intend to do anything so unreasonable as to run adits either in the direction of the Sutton well or the Carshalton springs.

Mr. FITZGERALD: Supposing your case is a reasonable one, what objection have you to submitting it to Parliament?

Witness: We do not care to do unnecessary work. We have our rights now, and why should we come to Parliament to confirm us in our rights? That is what it would come to.

Mr. *Joseph Francis*, formerly Chief Engineer to the New River Company, said that, from what he knew of the movement of the water in the chalk, he should think it was extremely improbable that any taken from the Railway Company's boring could affect the Water Company's well. He did not suggest that 10 million gallons a day could be pumped in the neighbourhood of the Railway Company's well without affecting the other; but he did say that a million gallons might be drawn.

Mr. *R. Cooper* gave similar evidence.

Professor *Boyd Dawkins* said there was an enormous quantity of water in the neighbourhood concerned; but he could not say how much, because none of the properly constructed deep wells had yet failed to meet demands made on them, even in periods of extreme drought.

Mr. FREEMAN then addressed the Committee. He said that if the Bill was allowed to pass it would introduce one of the most serious precedents which had ever been brought before Committees of Parliament for a great number of years. It was an extremely unusual thing for anybody to ask a Private Bill Committee in one particular instance to alter the general law as regarded an enormous class of interests in this country. He claimed no rights whatsoever for the Brighton Company *quâ* Company—*quâ* statutory Company—in respect of the water; but he claimed for them rights as landowners, similar to those possessed by every other landowner in the neighbourhood, or in any part of England, to deal with the water on their own land in such a way as they could for their own advantage, providing it was not flowing in a defined channel, in which case it must, of course, be left to be shared by other people down the stream. There was no shadow of doubt that what the Committee were being asked to do by the Bill was to alter, restrict, and prohibit certain rights which a landowner now had.

The Committee, without calling upon Mr. Fitzgerald to reply, found the preamble of the Bill proved.

LONDON COUNTY COUNCIL (GENERAL POWERS) BILL.

The Free-Wiring Clauses.

The Select Committee of the House of Lords, presided over by the EARL of CAMPERDOWN, had before them, last Thursday, the London County Council (General Powers) Bill.

Part 6 of this deals with the supply of electric fittings by the Metropolitan Borough Councils. By clause 30 it is enacted that the council of any Metropolitan borough being authorized to supply and supplying electrical energy may expend money upon the wiring and fitting and supplying with wires, fittings, motors, and apparatus the premises of their consumers, or prospective consumers, and enter into, and carry into effect, agreements and arrangements with respect thereto, and make such charges therefor as they may think fit; and the Council are to adjust the charges to be made by them so as to meet any expenditure incurred. By clause 31, every sum charged to a consumer, in respect of the wiring and fitting of the premises, is to be clearly stated on every demand note, distinct from the charge for energy. The total sums received and expended in each year (including the amount required for interest on and all sums applied either by way of instalments or by way of payments to sinking fund for repayment of any moneys borrowed) are to be separately shown in the published accounts of the electric lighting undertaking for such year. By clause 32, any council of a Metropolitan borough may borrow in the same manner, and subject to the same conditions, as if such expenditure were for the purposes of the Electric Lighting Acts 1882 and 1888 as amended by the London Government Act, 1899, such sums of money as may be required by such Council for the purposes of this part of the Act.

Opposition was offered to the Bill by the Electrical Contractors' Association and others.

Mr. PAGE, in addressing the Committee, submitted that, under the circumstances of the Bill, the power which was sought on behalf of the municipal councils should not be granted to them, because it operated unfairly on a certain body of ratepayers without any real and substantial corresponding advantage. It operated unfairly because the contractors who were petitioning were themselves ratepayers; and he contended that it was improper that, for the first time, now that they had built up their businesses, and invested their capital, a competitor should be brought in so serious and so wealthy as one of the great borough councils of London. It was true that these powers had been granted in a considerable number of cases; but as a rule it was under circumstances totally different from those which obtained in London. In the greater number of cases, the power was limited in this way: The councils were only entitled to supply fittings through contractors; and therefore damage was not necessarily done, because it was then open to the tradesmen or others who supplied fittings in the town to compete one with the other for the work of the borough council. He submitted that it was an unsatisfactory method, because obviously it left scope for a certain amount of discrimination to be exercised by the council officials. At the same time, if discrimination were fairly exercised, then no damage was done to the tradesmen who had established businesses in the town. In the present case it was suggested that gas companies had the power; and very often it was the fact the borough councils, whether they had the power or not to supply gas, also supplied the fittings for gas. There was a grave doubt whether a borough council who had bought out a gas company under powers did acquire the right to do that which the gas company clearly could do—supply gas-fittings; but in every case where the borough council owned the gas-works, they had bought them from a company, and had only continued the work which was formerly carried out by the company whose undertaking they had purchased. With regard to water, there was no case, so far as he was aware, in which a borough council were entitled to do pumping work, although they could sell water to the consumer.

Evidence was then called in support of the petition; the first witness being

Mr. *Thomas Wright*, an electrical contractor of Glasgow, who said that the Corporation Electrical Department had been a great success. The hire-purchase system was not carried on there to any extent; but there was a good deal of electricity sold for power purposes—the motors being supplied by private contractors. The contractors in Glasgow

numbered between 45 and 50 firms; and each was anxious to get as much work as he could for himself.

Mr. *L. G. Tate*, an electrical engineer and contractor, said that he had employed as many as 30 or 40 men; but during the last six months they had dropped down to 20. His business consisted entirely of wiring installation work, both for lights and motors. The reason why he opposed the Bill was chiefly because the money which he paid in rates was employed in direct competition with him. He could not afford to do work as cheaply as a council with their 10 per cent. profit, which they said they were going to charge. This would not even start to pay office charges, let alone living expenses. Therefore it was impossible for any contractor to compete on the terms that the County Council wished for under the Bill. In regard to the inspection of works, and as to whether that power of inspection should be placed in the hands of the borough councils, he said that he had had a great deal of experience in competing with borough councils; and it had also been reported to him, as Secretary of his Association, that where the borough authorities had their own wiring department in competition with contractors in the town, the corporation work was always connected on, whereas the contractor's work was not connected without considerable difficulty, and this not through any fault of the contractor. He could mention some cases where corporations had accepted their own tenders which were for sums which could not have been remunerative. The price of materials per light varied. In small houses—10 or 15 light houses—the absolute net cost, taking the price of materials, and allowing for the wiring to be run in wood casing under the floors and in steel tubes when let into plaster, for the bare wiring without fittings, would be close on 5s. 6d. to 6s. per light. In addition to this, they had to add the labour, which varied from 2s. 6d. to 4s. 6d. a point. He should not care to take on such work under 15s. 6d. to 17s. 6d. per light in a small house; and the price might go up, according to the class of wiring, to 22s. or 23s. This cost would be based upon 10 per cent., out of which he would have to keep up the office and all other expenses.

In reply to questions by Mr. LUSHINGTON, witness said that the Orders of the undertakers who supplied energy contained the clause that they "shall not be compelled to give a supply unless they are reasonably satisfied that the electrical lines, fittings, and apparatus are in good order and condition, and not calculated to effect injuriously the use of energy by the undertakers or other persons." It was under this clause the undertakers made their inspection; but he must say that in a number of cases the inspectors sent out were unqualified.

Mr. *Lionel H. Hordern*, the Manager of the Westminster Electric Supply Corporation, said that in 1894 his Company started a system of hiring-out electrical apparatus, such as motors and heaters, but after about four years they found it did not pay. This was due mainly to the apparatus becoming obsolete. Fashions changed so quickly in these days that a thing which people liked one day they did not want another; and they had had to abandon the experiment. But in 1898, they started their own system of wiring, which was still going on. The plan was to advance to the customer the cost of wiring, which was paid by instalments; and the customer chose his own contractor, and obtained an estimate from him. They had about 8000 consumers. The terms of repayment were very easy, because there was no interest charged at all.

Mr. *J. C. Bull*, the Manager of the City of London Electric Company, said that in 1898 they sent out a circular with a view to obtaining customers and supplying them with fittings and wiring their premises. The procedure they adopted, however, was that their engineering department drew up a specification and then called for tenders from various contractors. The Company paid the contractor; but the undertaking was not remunerative to the Company. In 1903, they expended, principally on wiring for lighting, £2947. At the end of 1904, they found that, after re-wiring all their installations, they had to write off a sum of £33. They gave up wiring because it would not really pay.

The Committee decided to approve of the substance of clause 30 in the Bill; and the Chairman intimated that when they reached this and the subsequent clauses, they would examine them in the same way that they examined all others.

The preamble of the Bill was agreed to; and after the clauses had been amended, the Chairman was directed to report the Bill to the House.

SOUTH LINCOLNSHIRE WATER BILL.

This Bill, which was previously before the Unopposed Bills Committee, sought power to incorporate a Company to supply certain parishes in South Lincolnshire with water. It came last week before a Select Committee presided over by Mr. TOULMIN.

Mr. WEDDERBURN, K.C., who appeared for the promoters, said the Bill was not opposed. Its object was to incorporate a Company to supply certain parishes in South Lincolnshire near the Wash, which were in urgent need of water, and to obtain the water from the Urban District Council of Spalding, who had more than they needed. The Company were under an agreement to take from the Urban District Council not less than 20,000 gallons and not more than 350,000 gallons per day; and there was no doubt that the Council were in a position to spare the water. The Company would pay the Council for water by a rental, which would not be less than £91 or more than £350 per year, and repay to the Council by half-yearly instalments the £14,000 which it would cost to lay the main.

Mr. *Shire* and Mr. *Blanchett*, two of the promoters of the Bill, were called by Mr. Wedderburn to speak as to their financial stability. They had deposited £500 between them towards the promotion expenses, and it was their intention to carry the matter through.

Mr. WEDDERBURN, replying to the Committee, said that nobody would be hurt if the scheme fell through. The Spalding Council would have laid a main for which they would get no rent from the Company; but they would simply be in the position of doing that which they must do in any case.

Mr. *H. Harvey*, the Clerk to the Spalding Urban District Council, said if the Bill did not pass the Council in all probability would not supply the area in question. If the Council had to lay their own main, the present rates would be increased.

Engineering evidence having been given, the Committee passed the preamble of the Bill, subject to the separated parishes being duly protected. Clauses for this and other purposes were discussed.

Subsequently, Mr. KEEN brought up a clause fully protecting the parishes concerned; the intention of the Committee being that the new Company incorporated by the Bill should not unreasonably make excuses for not supplying water to them. Words were also inserted confirming the agreement empowering the Company to purchase the Bourne Water-Works Company.

Mr. George R. Sims on the Lighting of Holiday Resorts.

Mr. G R. Sims having suggested that in lack of local enterprise was to be found one cause of the waning popularity of certain of our seaside resorts, many mayors and town clerks wrote to the "Daily Chronicle" pointing out what was done for visitors in their particular towns. Mr. Sims, however, still confesses himself unconvinced; and in the course of a reply, he makes the following remarks with regard to public lighting: "In a health-resort of which the mayor has eulogized the local enterprise during this discussion, the street-lights are turned out in the residential quarter at ten o'clock at night. In this—one of the most charming spots in England—I have had to strike matches at five minutes past ten, in order to find my way from my house to the pillar-box, and to strike several matches at once in order to discover whereabouts in the stone wall the post-box was concealed. The lighting of this large and important seaside town would not be tolerated in a Swiss village! After nightfall, it is a city of gloom; and the few visitors who venture abroad after nine o'clock, when the band ceases playing, have to grope their way about in a darkness which is depressing to a degree."

The Fate of Heathfield Natural Gas.

The "Southern Weekly News," referring to the Heathfield natural gas fiasco, says: There is something savouring of romance and mystery to the average person in the term natural gas; and an interesting link with the past is now being finally severed at Heathfield, with the demolition of the holder near the railway station. The legend on the gasometer in huge letters always caught the eye of passengers, and informed them, in case they might not know, that it contained "natural gas." There are many who have heard of the Natural Gas-Fields of England, of which Heathfield and the district was an integral part. With the removal of the holder, it may be taken for granted that, as far as the public are concerned, natural gas at Heathfield has shed its last ray. The Railway Company have control of the chief borehole, however, and get a sufficient and excellent illumination for their premises. Heathfield will shortly have coal-gas illumination, the producing plant for which is being rapidly put together.

Gas v. Electricity for Public Lighting at Deptford.

At the Meeting of the Deptford Borough Council last Tuesday, the Surveyor (Mr. T. Corfield) submitted a report on a trial arc lamp, which had been put up in one of the roads. The London Electric Supply Corporation, Limited, had furnished the following particulars in regard to the lamp: (1) The illuminating power equals 2000 candles; (2) the current used is 500 watts, or 0·5 unit; (3) the cost per unit is 1d.; (4) the cost of maintenance, re-carboning, &c., including the supply of carbons, is £6 10s. per lamp per annum. The Surveyor stated that on this basis the arc lamp would cost the Council as follows: Current, 4200 hours, at 500 watts, £8 15s.; maintenance, £6 10s.—total, £15 5s. (say £16) per lamp. He pointed out that the incandescent gas-lamps on the main roads cost £3 5s. 4d. each, inclusive of all charges. Approximately, therefore, five main road lamps could be erected and maintained at the same cost as one arc lamp. The ordinary street incandescent lamps cost £2 9s. 2d. a year; so that 6½ ordinary incandescent lamps would equal the cost of one arc lamp. He referred to the Lighting Committee's inspection of the lamp in question, when the general opinion expressed was that it gave only a concentrated light; that the intervening distance between it and the nearest gas-lamp (which had been extinguished) was very dark; and that a second lamp would be required at or very near the position occupied by the gas-lamp. The Committee, in endorsing the report, appended, for comparative purposes, the relative cost of main road lighting under the two systems as follows: "There are 267 No. 4 lamps on the main roads in the district (exclusive of special lamps), at £3 4s. 5d. (say, £3 5s.) each, £867 15s. The Committee are of opinion that at least 134 arc lamps would be required to replace these; and 134 arc lamps at £16 would come to £2144—making an increase of £1276 5s. in the lighting charges for the main roads only. This is not including the cost of supplying and erecting the columns with lamps and fittings, which amounts to £20 each. In view of the extra cost, the Committee are not prepared to recommend the Council to alter their system of lighting. In this connection, they desire to express the opinion that electric arc street lighting, to approach success, should be by means of central points over the highway, and not alternately placed on each side of the road." The report was adopted.

Concession to Power Users at Todmorden.—The Todmorden Town Council have agreed to a recommendation of the Gas Committee that the price of gas for motive power should be reduced to 2s. per 1000 cubic feet, less 12½ per cent. discount for prompt payment. There was some opposition to the proposal, on the ground that those who used gas for cooking purposes were equally entitled to the benefit of the lower price.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Tuesday, July 3.

(*Before the* LORD CHANCELLOR, *the* MASTER OF THE ROLLS, *and Lord Justice* COZENS-HARDY.

Ogden v. The Gaslight and Coke Company—Smith v. Same.

These were two actions which were tried together in March, 1905, before Mr. Justice Darling and a Special Jury.* They arose out of an explosion of gas which took place in October, 1903, in Regent Street, when a man in the employ of the Post Office was effecting some repairs to a telephone cable in one of the boxes fixed for the purpose at the corner of Glasshouse Street. On applying the blow-pipe, an explosion occurred, which passed on through the pipe conveying the cables to several successive boxes, the covers of which were blown off, and the two plaintiffs were injured. The amount of damage, if any, had been agreed; and the only question was that of liability, which the Jury found in favour of the plaintiffs, on the ground of the defendants' negligence. From this verdict the defendants now appealed, asking for judgment or a new trial.

Mr. DANCKWERTS, K.C., and Mr. VAUGHAN WILLIAMS (instructed by Messrs. Monier-Williams and Co.) appeared for the appellants; Mr. CLAVELL SALTER, K.C., and Mr. NORRIS (instructed by Mr. W. Hamilton Stilgoe) represented the respondents.

Mr. DANCKWERTS submitted that there was really no evidence of negligence to go to the Jury; and he also complained that the learned Judge had admitted evidence as to a leakage of gas in the same locality in July, 1904, ten months after the accident, which he submitted was not relevant to the state of things the previous October.

The whole of the evidence taken at the trial was read from the Judge's notes by Lord Justice Cozens-Hardy, and Mr. Vaughan Williams read the summing up, which was strongly in favour of defendants.

Mr. DANCKWERTS added a few remarks, in which he submitted that, in any case, the escape of gas was not the real cause of the accident, but the careless use of the blowpipe by the man at work, and that the defendant Company had done everything possible to detect the escape of gas, short of uncovering the whole of the mains and pipes, which was practically impossible.

Mr. CLAVELL SALTER contended that the learned Judge was quite right in leaving the matter to the Jury, as it was essentially a question for them. He argued that there was a twofold negligence on the part of the defendants which caused the explosion. In the first place, when they received written notice in July that there was an escape of gas, they did not act with sufficient energy and thoroughness; and, secondly, it was shown by the evidence that after this there was a more or less constant smell of gas in the same locality, which it was their duty to have been aware of and remedy. It was known that escapes of gas did occur, and a gas company ought to have men constantly on the look-out to detect them.

The MASTER OF THE ROLLS: Did you ever meet a gas employee who was able to smell gas?

Mr. DANCKWERTS said gas men had very keen noses for gas, as had been proved in this case and in many others.

Mr. SALTER said the defendants attempted to put the blame on to the Post Office; and there was no doubt that the presence of these boxes made the escape of gas more dangerous than it would be otherwise. But this only threw greater responsibility upon the defendants to keep their gas under control. Counsel was proceeding to enlarge on this point with reference to the evidence, when

The LORD CHANCELLOR intimated that the Court did not wish to hear him further.

Mr. DANCKWERTS, in reply, referred to the evidence showing that the defendants did everything possible in July and August to discover a leak, but in vain.

The LORD CHANCELLOR, in giving judgment, said the case was one eminently for decision by a Jury, if there was any evidence on which they could act; and it certainly was not the function of the Court to set its opinion, upon a balance of evidence, against that of a Jury. Was there any evidence of negligence on the part of the defendants? It rested on the notice, dated July 31, to the effect that a strong smell of gas was detected in the box. The Company appeared to have made some investigation, and did not discover anything wrong. There was further evidence that between that date and Oct. 15, several persons noticed that there was a strong smell of gas in the locality, and complaints were made of it by people frequenting the houses in the neighbourhood. On the 15th of October the explosion occurred; and Mr. Danckwerts had stated, no doubt accurately, that search was made to ascertain the cause of it. This search was ineffectual; but it was quite certain something must have caused the explosion besides the use of the flame; there must have been inflammable material there, or there would have been no explosion. Subsequently a smell of gas was again detected, and another explosion occurred in June of the following year. No defects—at least, none of importance, and that were not repaired on the spot—were detected in the interval. It seemed to him quite proper to admit this evidence, because it was to show that there was a leakage, unamended, which might perfectly well be the same as that which was the cause of the original trouble the previous October. There was also evidence that gas was seldom found in these boxes to a dangerous extent; and likewise evidence, or a statement, that it could be prevented. The real point was that there was notice given to the Gas Company of the presence of gas, and ample opportunity for them to learn, what others had learned in the interval between August and October, that it was present, there being a strong smell. It seemed to him that there was a duty upon the defendants to put an end to whatever cause created that smell, which indicated danger—and proved, in the event, that there was a serious danger—at the time. He thought, therefore, there was evidence upon which the Jury were entitled to find negligence on the part of the defendants. Another point made was that there was an intervention by some third party between the negligence of the defendants and the accident itself; and authority was quoted to the effect that the negligence of the defendants must be the efficient cause of the injury in order to be subject-matter of an action. He did not know whether anybody was prepared to give an exhaustive and final definition of what was, or was not, "efficient cause;" but, as he understood the contention of Mr. Danckwerts, it was that because this explosion was immediately caused by the application of a flame by a servant of the Post Office, and because he was negligent in applying that flame to the pipe, therefore defendants were exonerated for their negligence in allowing the gas to be where it was to be affected by the flame. He could not agree with this. He thought the combined negligence of both caused the accident; but unquestionably the defendants' negligence, by allowing the gas to be where it was, was, if the phrase must be used, an, if not the, "efficient cause." Accordingly, he was of opinion that the appeal ought to be dismissed.

The MASTER OF THE ROLLS and Lord Justice COZENS-HARDY both concurred.

The appeal was accordingly dismissed, with costs.

* See "JOURNAL," Vol. LXXXIX., p. 786.

The Right to Inspect Water-Fittings.

At the West London Police Court, on Friday last, Mr. W. H. Northcutt, residing at 6, Earl's Court Square, Kensington, appeared to answer an adjourned summons, taken out by the Metropolitan Water Board, for hindering one of their inspectors from entering his premises and making an inspection. On two occasions, it was stated, Inspector Raybone called, and was refused admittance by the defendant, who informed him that he must show that the Act of Parliament gave him authority to enter. According to the Metropolis Water Act, 1871, under which the proceedings were taken, it was necessary for the prosecution to prove two things before a conviction could be obtained—first, that a constant supply had been requisitioned for the premises in question; and, secondly, that the Water Company had served a notice on the owner or occupier, requiring him to have certain fittings fixed there. The latter point could not be proved by the prosecution, because the inspector who was supposed to have served the notice was dead. The Magistrate said no legal proof had been brought to the Court of the existence of a notice, and the summons must fail. He dismissed the case, with £10 10s. costs against the Board.

Water-Mains in "Undedicated" Roads.

At the Monmouthshire Quarter Sessions last Wednesday, the Rhymney and Aber Valleys Gas and Water Company, Limited, appealed against the decision of the Tredegar Magistrates, who fined the Company £100 and 30 guineas costs for refusing to lay a main at Aberbargoed, as reported in the "JOURNAL" for June 5 (p. 651). Mr. Amphlett, K.C., and Mr. Corner appeared for the appellants; Mr. Acland, K.C., and Mr. Bosanquet represented the respondents. Mr. Acland pointed out that the question for decision was whether or not the Water Company were bound to lay a branch main from their existing 5-inch main for the supply of the houses in a new street, or whether the owners of the houses in that street were bound to draw their water from a main already existing on the north side of the property at a greater distance. The owners of the houses (the respondents in the action), owing to the refusal of the Company to provide a water supply, had lost a considerable sum in rent and in damage to the property. Mr. David Williams, senior partner in the firm of Messrs. Williams and Sons, builders and contractors, of Bargoed, who built the houses referred to, having been called, Mr. A. R. Cawley, the General Manager of the Water Company, said the reason the main had not been laid was because the houses had not been properly rated by the Local Authority. Moreover, they could conveniently be supplied from the existing main at the back. Mr. Acland urged that the owner of the houses obviously had a right to be supplied, as "people did not erect streets on private property." The Magistrates upheld the conviction, and dismissed the appeal, with costs.

A Company's Failure to Supply Compensation Water.

At the Mold Petty Sessions recently, the Magistrates had before them a summons taken out by Mr. P. T. D. Cooke, J.P., against the Hawarden and District Water-Works Company. As the owner of property at Rhydymwyn, Mr. Cooke sought to recover certain penalties to which, it was alleged, the Company had rendered themselves liable in not complying with the provisions of their Act of Parliament. It was explained by Mr. W. H. Chinton that what Mr. Cooke complained of was that defendants failed to supply a certain quantity of compensation water to Garth Brook. The Act stated that they should deliver into the brook compensation water to the amount of 250,000 gallons during every 24 hours. The Company were liable to a penalty of £5 a day for failure to supply this water. Mr. Cooke had made reasonable proposals, but had failed to come to any arrangement with the Company. For the defence, Mr. R. V. Bankes said that under the Act the Company were entitled to make reservoirs capable of holding 62 million gallons; but the capacity of their present reservoirs was about 13 millions. It was laid down by the Act that compensation water was to be supplied after the completion of these works. But the works had not been completed to the extent stipulated for. The riparian owners were really in a better position than if the Company impounded all the water they were entitled to, and furnished the requisite amount of compensation water. Evidence on both sides having been given, the Magistrates held that there had been a breach of the Act, and inflicted a nominal penalty of 1s. a day during the 48 days on which the Company admitted they did not supply compensation water. They allowed a case to be stated.

MISCELLANEOUS NEWS.

CARBURETTED WATER GAS FOR ROCHDALE.

Starting the Installation.

The new carburetted water-gas plant, the erection of which has been in progress for some months at the gas-works of the Rochdale Corporation, was formally "started" on the 28th ult., in the presence of a numerous company who had received an invitation from the Chairman of the Gas and Electricity Committee (Mr. Joseph Walker). The building in which the new plant is placed is on the site occupied by part of the old retort-house, and is of a most compact and convenient description. The work of erecting the new plant has been in the hands of the Economical Gas Apparatus Construction Company, who have carried out their contract most satisfactorily; and as the cost is below the estimate—£15,500—the Committee have every reason to be gratified. Among those present at the starting of the plant were the Mayor (Mr. J. E. Jones), the Town Clerk (Mr. W. H. Hickson), the Gas Engineer (Mr. T. Banbury Ball), under whose supervision the installation was carried out, the Contractors' Assistant Manager (Mr. E. J. Davidson), and Mr. Joseph Morris, the Managing-Director of the Jersey Gas Company.

The visitors assembled in the turbine-room, where Mr. Walker briefly described the essential features of carburetted water gas, and explained the difference in the process of its manufacture as compared with ordinary coal gas—making use, for this purpose, of a concise *résumé* which had been prepared by Mr. Ball. From this, the company learned that the site on which the plant has been erected was recently occupied by coal-gas plant capable of producing about 480,000 cubic feet in 24 hours, and the two sets of carburetted water-gas plant will each produce 750,000 cubic feet in the same time, while there is room for a third set if required. It is proposed to use only one of the sets; but in the event of repairs being needed, or in case of any mishap, the other can be brought into work at once. It is intended to restrict the proportion of carburetted water gas in the coal gas to 20 per cent. In conclusion, Mr. Walker referred to the excellent work done in connection with the installation by Mr. Ball, Mr. Stenhouse (the Borough Analyst), Mr. Davidson, and Councillors Sharp and Fielden. There remained for him, he added, one pleasant duty to perform. They had among them a gentleman who was well known and well liked by them all—ex-Alderman W. J. Petrie—and he was sure they would all be delighted to know that he had consented to turn on the steam.

Mr. Petrie said he was very pleased to see the completion of the installation of water-gas plant, and was quite sure the Gas Committee had done the very best for the town in erecting it, as it would enable them to work economically. He could remember many anxious hours in past years, when the wintry weather had hindered the carriage of coal for gas making, and when Mr. Ball and he had had to scour the town to see where they could get it. A good deal of this would be done away with in the future; and the new apparatus would make things work more pleasantly, and he trusted would enable them to begin again building up their reserve fund. Mr. Petrie then turned on the steam with the words "Good luck to the apparatus."

The party afterwards proceeded to the house in which the plant is installed, where the process was described as it went on—gas being produced and shown by lighting it within five minutes of the steam being turned on at the turbine. They then returned to the turbine-room, and partook of refreshments on the invitation of Mr. Walker, whose health was most cordially drunk.

OLDHAM CORPORATION GAS UNDERTAKING.

The Past Year's Working.

The General Manager of the Gas and Water Departments of the Oldham Corporation (Mr. Arthur Andrew) has prepared a report on the working of the Gas Department in the year ending the 25th of March last.

The total expenditure on capital account in the twelve months reported upon was £23,755; the largest amount (£13,362) being at Hollinwood. The gross revenue on gas-works account amounted to £169,661, and the gross expenditure to £128,905; the balance carried to the profit and loss account being £40,756. Deducting from this the annuities during the year (£3414), interest on loans and stock (£13,014), and sums payable to the respective sinking funds (£4554), there is a net profit of £19,774. Adding the balance brought forward and one year's accrued interest from the annuity redemption fund, and deducting the amount to which the Corporation are entitled in aid of the borough fund (£6991), the credit balance to be carried forward is £13,895. The gross profit of £40,756 exceeds that of the previous year by £18,341; and the net profit of £19,774 compares with the net profit of £2636. On the expenditure side of the revenue account, there was a substantial reduction under the head of manufacture. The cost per ton for coals was less than in the preceding year, and a greater yield of gas was obtained from the same quantity carbonized. A reduction was also effected in the cost of purification and in carbonizing charges; the latter being due to the further installation of machinery at Hollinwood. The amount expended in repairs and maintenance of works was £5275 less than during the year 1904-5. The cost of fixing cookers amounted to £2584; the whole of which was charged to revenue. A sum of £1000 was transferred from the reserve fund to the credit of the capital account for depreciation of cooking-stoves.

The quantity of gas supplied to the corporate street-lamps and municipal buildings free of cost during the year was 2,038,000 cubic feet. There were 64 additional lamps erected within the municipal borough, and 32 in the out-townships. The total number of lamps fixed in the supply district on the 25th of March was 5361. The total number of incandescent lamps at that date was 1434 within the borough, and 401 in the out-townships; being an increase of 213. The quantity of gas manufactured at the different stations during the year was: Oldham, 101,793,000 cubic feet; Higginshaw, 648,068,000 cubic feet; Hollinwood, 413,233,000 cubic feet, ditto (water-gas plant) 103,816,000 cubic feet; Royton, 52,084,000 cubic feet—total 1,318,994,000 cubic feet, against 1,248,574,000 cubic feet in the preceding year, being an increase of 69,420,000 cubic feet, or 5·55 per cent. The quantity of coal and cannel carbonized was 110,370 tons 11¼ cwt., and 339,913 gallons of oil and 46,758 gallons of benzol were used in gas production. The average quantity of coal gas made per ton of coal and cannel carbonized was 11,010 cubic feet, compared with 10,614 cubic feet in the previous year. The loss of gas from leakage, &c., was 76,712,000 cubic feet, or 5·82 per cent. of the quantity made, compared with 7·02 per cent.

The total number of meters fixed on the 25th of March was 50,791, of which 844 were of the prepayment type. There were 521 meters fixed in new premises and others in which gas had not previously been used; and 1105 were disconnected and the services taken out where gas was not likely to be required in the future. The number of additional cooking-stoves fixed during the year free of charge to consumers was 3879. The total number in use on the 25th of March was 9242. Prior to adopting the policy of supplying and fixing stoves free of cost, the quantity of gas used in private houses and shops was decreasing, owing to the spread of the incandescent system of lighting. This decline had now been arrested; the quantity of gas consumed in this class of property being 40,647,000 cubic feet more than in the previous year. There was also a large increase in the gas used in the various machine works; but, on the other hand, there was a decreased consumption in cotton-mills, due to the adoption of incandescent lights. The total net increase in the quantity of gas actually consumed was 80,438,000 cubic feet compared with the year 1904-5.

The contracts previously entered into for the erection of new retorts on the regenerative system, together with stoking machinery, coke conveyor, and coal breaking and elevating plant, at Hollinwood, were completed during the year; and Mr. Andrew says the economy that was anticipated in the production of gas at that station has been fully realized.

In view of the net surplus of nearly £14,000 shown (after providing the sum to which the Corporation are entitled in aid of the rates), the Gas Committee resolved to recommend that the price of gas to large consumers should be reduced to the following scale: Up to 100,000 feet a quarter, 2s. 8d. per 1000 feet (1d. reduction); from 100,000 to 500,000 feet, 2s. 7d. (2d. reduction); from 500,000 to 1,000,000 feet, 2s. 6d. (3d. reduction); from 1,000,000 to 5,000,000 feet, 2s. 5d. (4d. reduction under 2 million; 3d. over); 5,000,000 feet and upwards, 2s. 3d. (3d. reduction); and consumption by public lamps in the out-townships, 2s. 5d. (4d. reduction). A general discount of 6d. per 1000 feet is allowed consumers if payment is made before fixed dates.

When the minutes came before the Town Council, several questions were asked; and one member—Mr. Plant—objected to the expenditure of £8 4s. 6d. on the Gas Engineer attending the meeting of the Institution of Gas Engineers. This he termed a "scandalous waste of the ratepayers' money on a matter which was more personal than anything else." He did not object to the Engineer going at a moderate price—it was the amount charged that he protested against. Alderman Johnson referred to the proposed reduction, and said he thought this was the first time a graduated scale of charges had been introduced. He moved that the matter be referred back, with a request that the Committee should more favourably consider the question of a reduction to the smaller consumers. Mr. Rothwell pointed out that a deputation of gas-engine owners intended to wait on the Committee with reference to a reduction for day-load for gas-engine purposes.

Replying to the discussion, Alderman Hanson remarked that the Committee had nothing to do with the amount of profits handed over in aid of the rates. This was managed in the Borough Accountant's department; and the Corporation were bound by Acts of Parliament as to the amount of profit handed over. With regard to Mr. Plant's speech, the Council had sanctioned the visit of the Engineer to the Institution meeting. It had been the custom for many years; and he believed that the Corporation benefited by it. As to the price of gas, Alderman Johnson's argument was that the Committee were not treating the small consumers rightly; but they found that the largest consumers were the real profit-producers. They had one firm who took 82 million feet per annum. If they were to make any further reduction, they would be depleting their balance. Another penny would make a difference of £2800. The biggest reduction was for the public lamps in the out-townships; and in this the Committee thought they would be doing justice to the out-townships, and helping them to light their streets thoroughly. There had been deductions in the past of 1d. over 2 million feet, and 3d. over 5 million feet; so that they were not making so large reductions to the large consumers as appeared at first sight. He thought they were meeting the claims of every class of consumer as fairly as possible. With regard to gas-engines, he had arranged that the deputation should meet the Committee; and until they had done so, he would rather say nothing on the matter.

On a vote being taken, 25 voted for the amendment to refer back the minute relating to the reduction in price, and 10 against. With this exception, the minutes were then passed.

REDUCTION IN PRICE AT STOKE.

The Stoke Town Council, at their last monthly meeting, had before them a recommendation of the Gas Committee that the price of gas supplied on and after the 1st inst. should be as follows: For private lighting by ordinary meter, 3s. 4d. per 1000 cubic feet, with a discount of 6d., as at present. For private lighting by prepayment meter, 3s. 4d. per 1000 cubic feet, with a discount of 2d. For motive power, 3s. 4d. per 1000 cubic feet, with a discount of 10d., as at present.

The proposal was supported by Alderman Geen, who referred to the working of the gas undertaking for the year ending March 31. He said

there was a gross profit of £7732, as compared with £9232 the previous year. The reduction of £1500 thus shown was mainly due to the increased discount of 1d., and to a decreased consumption of gas. After discharging principal and interest and paying income-tax, there was a net profit of £3616, as compared with £4955 a year ago. The Committee were devoting £1627 in relief of the district rate; and the rest of the surplus was being used for meters, mains, &c., and in reduction of the bank overdraft. They had considered the price of gas, and had decided to reduce this 2d. to both ordinary and slot consumers within the borough, and 5d. to consumers at Trentham (who were paying 3d. more than those within the borough). The Trentham people formerly paid 6d. more than Stoke. This, however, was in course of time reduced to 3d.; and he thought they should now be put, as a matter of business prudence, on an equal footing. He believed there would be an increased consumption at Trentham, and consequent profit to the Corporation. He further pointed out that Stoke people, through the rates, not only obtained the profit earned by themselves, but that earned by Trentham. As to the price charged for gas, he referred to the large amount of capital expenditure which the Gas Committee had during the past few years met out of revenue, and to the sums they had handed over in reduction of rates; and said that if there were no contributions made to the rates, and no liabilities to be met other than those which private concerns had to face, he would not hesitate to go in immediately for a large further reduction in the price of gas.

The recommendation was agreed to.

NOTTINGHAM CORPORATION GAS SUPPLY.

The Position of the Engineer—Adoption of the Annual Report.

At the Meeting of the Nottingham City Council on Monday last week, Mr. Pendleton asked Sir John Turney, as Chairman of the Committee appointed to inquire into the gas undertaking, whether he would endeavour to prevent the Gas Committee from passing any further resolution in condemnation or commendation of the Gas Engineer (Mr. J. H. Brown) until the Special Committee had presented their report.

The question had reference to the resolution passed by the Committee on the 22nd ult., as mentioned in the "JOURNAL" the following Tuesday, congratulating the Gas Engineer on his success in winning the gold medal of the Institution of Gas Engineers. Sir John Turney said he thought it would be prudent if the Gas Committee and other Committees of the Council would not pass any resolutions until the full report of the Investigation Committee was presented.

At a later stage of the proceedings, the annual report of the Gas Committee (*ante*, p. 56) was presented. Alderman Mutch asked if it would not be wise simply to receive the report. By adopting it the Council might be committing themselves to a policy which might not be satisfactory to some members. The report was, however, adopted.

GAS AND ELECTRICITY SUPPLY AT LONGTON.

Progress in the Past Year.

The Chairman of the Gas and Electricity Committee of the Longton Corporation (Alderman E. Brookfield) has presented his report on the working of these undertakings in the year ending March 31.

The total quantity of gas made was 145,592,000 cubic feet, of which 4,859,000 cubic feet were carburetted water gas. The gas sold was 315,000 cubic feet less than in the preceding year; and the revenue derived was less by £916, due to the reduction in price, which commenced in September. Since that time, however, there has been a distinct increase in the consumption. The revenue from residuals was less by £138. There are 67 gas-engines in use in the borough; and the quantity of gas supplied to them last year was 9,960,000 cubic feet. The Committee hope this quantity will be materially increased by the important reduction they have made in the price charged to large users of motive power. The total receipts last year amounted to £25,856, and the expenditure to £16,194; leaving a gross profit of £9662, which was carried to the net revenue account. After deducting interest and sinking fund charges, amounting to £6152, and having paid over to the borough fund, in relief of the rates, £2500, together with £500 to the reserve fund, there remained a further balance of £510. The Committee recommend that the loss of £135 on the Electricity Department for the year should be made good, and that the balance of £374 should be carried to the electricity depreciation account; thus disposing of the whole of the gas profits, and leaving a debit balance the same as before—viz., £1405—to be carried forward. They also recommend that £921, less £308 invested with the Walsall School Board (shown in the balance-sheet to the credit of the reserve fund) should be transferred to the reserve and depreciation account referred to in the report on the electricity undertaking. In respect of this the Committee report that an equivalent of 1130 8-candle lamps was added during the year; making a total of 7592 8-candle lamps fitted to March 31 last. The total number of units sold was 89,233, against 68,363. The gross profit amounted to £983; being an increase of £290. The balance brought forward (£1062), together with interest and sinking fund charges (£1118), makes a total of £2180. From this must be deducted £983, the surplus of the revenue account, and £135, the amount received from the Gas Department, leaving a balance of £1062 to be carried forward—the same amount as before. The Committee recommend that a separate banking account should be opened as a reserve and depreciation fund for the Gas and Electricity Departments; and that the £374 received from the Gas Department, with the sum of £1052 shown in last year's account, be paid to the credit of the fund, as well as the £619 received from the Corporation as interest—making a total of £2045 depreciation on the electricity works.

Appended to the report are the accounts, and also a tabular statement by the Engineer and Manager (Mr. W. Langford) of the general results for the year. This shows that the total quantity of gas made was disposed of as follows: Sold to private consumers, 115,692,000 cubic feet; sold for public lighting, 18,666,000 cubic feet; and used on works, 1,637,000 cubic feet—leaving 9,597,000 cubic feet, or 6·59 per cent., unaccounted for. The make of gas per ton of coal was 12,100 cubic feet, of which 11,165 cubic feet were sold; the coke made was 7559 tons, or 13 cwt. per ton of coal; the tar made was 735 tons; and the sulphate (including stock), 146 tons. The residuals realized the following amounts per ton of coal used: Coke, 4s. 2·08d.; tar, 1s. 8·04d.; and sulphate, 2s. 1·75d.—making a total of 7s. 11·87d.

The Committee expressed their entire satisfaction with the results of the year's working, as shown by the report and accounts.

THE PAST YEAR'S WORKING AT HEREFORD.

A Satisfactory Report.

The report on the working of the Hereford gas undertaking for the year to March 25 last, which the Engineer (Mr. William Parlby) recently submitted to the Gas Committee, reveals a very satisfactory state of affairs.

The number of consumers continues to increase, though on this occasion, for the first time since 1896, there is a slight decrease of about 150,000 cubic feet in the consumption. This trifling falling off is, Mr. Parlby says, accounted for by the joint railway companies adopting the incandescent system, and reducing the size of the burners in the whole of the signals, and by the General Hospital and the Post Office installing the electric light. In these three instances, the consumption of gas has suffered to the extent of 1,680,000 cubic feet; but this reduction has been recouped from other sources, with the exception of the small quantity named. The total consumption last year was 119,841,156 cubic feet. During the seven years that the electric light undertaking has been in operation, the gas sold and accounted for has increased 26·91 per cent.

In considering the accounts, it has to be borne in mind that a reduction of 3d. per 1000 cubic feet was made on June 30 last year in the price of gas, and an extra 3d. per 1000 cubic feet as discount was given to those using gas-engines, besides a reduction of 5s. each on the public lamps. The Committee estimated that these reductions in the price of gas would diminish the income by £1252. The actual reductions for the three quarters amount to £1127; but as this year the discount for the March quarter is deducted for the first time in advance from the gas-rental, the net reduction of income from private consumers and public lighting is £1395. Under the head of residuals, there is a decrease of £141, caused by less coal having been carbonized. The gross income for the year stands at £20,390, against £21,896 for the previous year, or a net decrease of £1506. While the recent reductions in price have very materially diminished the income, remarks Mr. Parlby, it is gratifying to find that various economies in expenditure have been brought about by the specially good working results obtained during the year. Under the head of coal alone, there is the substantial reduction of £683. This is principally accounted for by more gas being obtained from the coal carbonized, and by less coal being therefore required. Purification cost less by £140, which is attributable to economy in working in the new purifying-house, and to a better price being obtained for the spent material. The outlay for maintenance of works and plant is reduced by £159. Some items show an increase; but the net result is a decrease of £738 in the expenditure—the total being £15,775, against £16,513 in the previous year. Taking the total income as £20,390, and deducting therefrom the expenditure, the gross profit stands at £4615, which is only £768 less than the previous year. After charging interest on loans and adding the cottage rents and dividends on Consols, the net profit amounts to £3996, or only £705 less than the previous year, notwithstanding the reductions in price.

During the year there were carbonized 12,014 tons of coal, producing 131,068,000 cubic feet of gas; the average yield per ton being 10,909 cubic feet, or an increase of 314 feet. The gas sold and accounted for averaged 9974 cubic feet per ton. The improved yield of gas and the increased sale of gas per ton of coal have necessitated a less quantity of coal being used, which accounts for the saving of some 600 tons during the year; while about the same total quantity of gas has been sold and accounted for as for the year ended March 25, 1905. The percentage of leakage and condensation on the make of gas works out 8·56, which is a reduction of 1·86 per cent. on the previous year. This figure, Mr. Parlby points out, would be considerably further reduced if, as in some towns, an allowance was made for the difference in temperature at which the gas is measured at the works and that at which it is measured by the consumers' meters. This practice, however, has never been adopted in Hereford; but if the allowance were made over the previous ten years, the average for that period would be only 4·52 per cent. The average illuminating power of the gas supplied was 16·10 candles for the year. There are 1730 ordinary, and 2077 prepayment consumers.

The report was presented by the Gas Committee to the Town Council at their meeting last Tuesday; and the Deputy-Mayor (Alderman C. Witts), in moving its adoption, said he thought the members would agree with him that it was a very satisfactory one, and that he should make public acknowledgment of the services of Mr. Parlby, to whom, and to the Gas Committee, the results produced were due. The outstanding feature of the year's working was that the Committee had given, out of the profits resulting from the gas-works, £1000 to the improvement fund. They had allowed £1350 to the consumers and on public lighting, and also placed £941 to the revenue account. This had been accomplished notwithstanding the fact that the Committee sold their gas, and good gas too, at 2s. 6d. per 1000 cubic feet, and were allowing an extra 3d. for power.

Cheaper Gas for Manufacturers at Walsall.—The Walsall Gas Committee recommend the Town Council to reduce the price of gas supplied to manufacturers from 2s. 3d. to 2s. per 1000 cubic feet, with the usual discount of 2½ per cent.

PUBLIC LIGHTING OF NEWPORT (MON.)

Gas v. Electricity.

The Borough Electrical Engineer of Newport (Mon.)—Mr. H. C. Bishop—recently issued a report on the subject of the employment of electricity for lighting the side streets of the town; and in the course of it he represented that the ratepayers would be saved 7s. 6d. per lamp per annum by using Nernst lamps in lieu of incandescent gas-lamps. The statement was, of course, noticed by Alderman Canning, the Engineer of the Gas Company, who deemed it advisable to give the ratepayers a little information as to the respective values of these two illuminants. This he did in a letter to a local paper last Tuesday. It appears therefrom that the proposal is to erect 200 Nernst lamps in place of 200 existing gas-lamps, a large number of which are incandescent lamps; and the assumption is that 200 Nernst lamps are equal in illuminating value to 200 incandescent gas-lamps, and cost less to erect and maintain. Alderman Canning asserts, as the result of long and careful investigation, that the value of the Nernst lamp, compared with an incandescent gas-lamp fitted with a No. 4 Kern burner, tested under working conditions, is as 1 : 2·075—that is to say, an ordinary incandescent gas-lamp is worth two Nernst lamps and something over. To give the same effective illumination, one night with another over the year, it requires 207·5 Nernst lamps as against 100 incandescent gas-lamps. The respective costs for lighting the proposed area with equal efficiency work out as follows: 415 Nernst lamps, at 57s. 6d. per annum, £1193 2s. 6d.; 200 incandescent gas-lamps, at 65s. per annum, £650—being a total saving of £543 2s. 6d., or 54s. 3¾d. per lamp per annum. Alderman Canning tells the ratepayers that they must either accept half the light under the Electricity Committee's proposal, or pay twice the money to obtain a light equal to incandescent gas. In the latter case, they will also have to pay the interest, sinking fund, &c., on an additional capital of £724 10s., which is wholly unnecessary.

But he remarks that this question can be discussed by engineers at any length without any useful practical result, so he throws out the following suggestions: (1) That the Lighting Committee (which is also the Electricity Committee) should allocate to the Electricity Department and the Gas Company a side street of sufficient length, and fairly straight, and cause it to be lighted partly by ordinary incandescent gas-lamps, as described, and partly by Nernst electric lamps, fixing the lamps at equal distances apart, gas and electricity alternately. (2) That this test shall commence on the 1st of November next, and terminate on the 1st of May following, unless either party expresses a desire to continue it for twelve months. (3) That recognized experts, accepted by the Gas Company and the Electricity Department, be appointed to make the necessary photometrical and other tests from time to time as may be agreed upon. (4) That an exact record be kept of all gas used and the electric energy consumed, and of the cost of repairs, maintenance, and renewals of mantles and filaments in each case. (5) That two other side streets—facing each other, if possible, and leading into a main thoroughfare—be selected, one handed over to the Gas Company to light with incandescent gas, and the other to the Electricity Department to be lighted by Nernst lamps. In this case, the judgment as to the lighting effect for the same cost it is suggested shall be left to a jury of the public, unaided by experts; due records being kept as above described. (6) The expenses connected with the tests to be paid by the party whose light proves the weaker at the same cost.

This certainly appears to be a satisfactory way of arriving at a conclusion with respect to the relative values of these lights; and, as Alderman Canning remarks, it is more especially necessary that such a test should be made, as the Lighting Committee of the Corporation have taken but very little advantage of the incandescent gas-lamp—placing themselves thereby in sharp contrast with the lighting committees of the most leading progressive municipalities in the kingdom.

PUBLIC LIGHTING OF EXETER.

Recommendations of the Joint Lighting Committee Adopted.

At a Special Meeting of the Exeter City Council on Monday last week, there was a discussion on the proposed scheme for rearranging the lighting of the city, to which reference was made in the "JOURNAL" for the 26th ult. (p. 935). The Joint Lighting Committee recommended that, on the termination of the existing agreement with the Gas Company at Michaelmas, the electric light should be adopted in the streets forming the existing tramway routes and other streets along which electric cables are laid, and also for the junctions of main thoroughfares and such other places as may be approved for lighting with 400-candle power lamps to the number of ten. As regards the other streets, in which there are no electric cables, the Committee recommended that these should be lighted by gas in accordance with the estimate submitted by the Gas Company.

At the outset Alderman J. G. COMMIN moved—"That the decision upon the lighting of the streets on routes along which the electric cables are laid, other than tramway routes, be deferred until an opportunity shall have been afforded of practically comparing the effect of lighting by gas and electricity." He explained that he did not at all desire to prejudice the supporters of either gas or electric light, but thought that an opportunity should be given to the citizens to judge for themselves between the two kinds of illumination. It was difficult to form an opinion as to which was the better kind of lighting from the figures placed in their hands, as these were largely misleading. The cost of such a test as he proposed would be very small; and though it might delay the ultimate decision of the question as to the kind of lighting which they would adopt, this was not of great importance, as the Gas Company were bound by Act of Parliament to continue to supply the city.

Mr. W. R. LISLE seconded the motion, which he thought very fair and reasonable.

Alderman W. H. REED, the Chairman of the Electric Lighting Committee, contended that the proposed test was unnecessary, as the members of the Council were quite competent to judge without the ratepayers as to whether or not the light was suitable. The Gas Company and the Electric Light Committee were quoting for identical candle power, so that there was no reason to place lamps in juxtaposition to judge between them.

Mr. J. CAMPION held that, as they were spending the ratepayers' money, it was only fair that the ratepayers should have an opportunity of expressing their wishes on the matter. The average citizen had no clear idea conveyed to him by the information that they were going to give him a light of so many candle power. He should have an opportunity of inspecting the two lights, and deciding which was the more effective illuminant.

Alderman H. GADD thought the proposed demonstration would be of use to the Council as well as to citizens outside, for the members were somewhat in the dark; and unless they had an opportunity of comparing the lights, they could not give an intelligent vote.

Mr. E. C. PERRY characterized it as rather childish to want to experiment. The citizens were desirous of getting a better illuminant than they were paying for at the present time; and it was in their interest that the Committee's recommendation should be adopted.

After some further remarks, a vote was taken, with the result that the motion was rejected by 27 votes to 17.

Alderman REED then moved the adoption of the recommendations of the Committee. He said it had been stated that the additional cost of adopting the electric light would be £430 per annum; but this statement he maintained would not bear investigation. The matter was not one which should be settled on a difference of cost, but on whether the Council would give the city a satisfactory light. They had their own electric light works, and if the Electric Light Committee secured the order for the business, it would add to the output of the works; and it was believed it would increase their profit. If they had to pay £250 or £280 a year more for lighting, it would only be on paper, because any profit they obtained would return to the ratepayers. Before full inquiry was made, he had been of opinion that the Committee were not in a position to compete with the Gas Company for the lighting of the streets; but, after careful investigation, he was now convinced that they would be able to do so, and satisfy the ratepayers. He submitted the following table, showing the comparative cost of lighting by electricity and gas on the tramway routes now lit by gas, in the streets along which electric cables are laid, and also for ten lamps of 400-candle power each:—

	Electricity.	Gas without Controllers.	Gas with Controllers.
Annual cost	£1971 ..	£1722 ..	£1540
Cost of conversion . . .	1368 ..	1251 ..	2048
Annual charge for first five years	2244 ..	1972 ..	1950

Alderman Reed explained that the latter charge was made on the assumption that the cost of conversion was spread over the period named.

Mr. CAMPION, though a member of the Committee who considered the question, contended that a great deal more information was necessary to enable the Council to come to a satisfactory decision. The report was incomplete, crude, and unbusinesslike. By deciding on gas lighting, they would have an annual saving of £480. It was said that electricity would give them more light for this extra expense. In regard to the duration of light, this would certainly not be the case, for the Gas Company would give 3745 hours of lighting per annum as against 3600 hours offered by the Electric Light Committee. This was a difference of 145 hours per annum, or 24 minutes per light per night, in favour of gas. By adopting gas they would thus secure 44 hours' additional lighting per night on the tramway route, and on the three sections 216 hours' more light. They would begin the use of electric lighting in these thoroughfares with an expenditure of £480 per annum more than it would cost if they adopted gas lighting; and he did not believe it would stop there. Alderman Reed had said that the profit on the electric lighting would go into the pockets of the ratepayers. It was equally true that any loss would have to come out of their pockets; and his opinion was that in a few years it would be found that, instead of £480, it would be £960. Gas had proved immeasurably superior to electricity as an illuminant. In the report of the Committee, it was admitted to be cheaper; and lighting engineers said it was more reliable. Only on the previous night Topsham [a suburb of Exeter] was in darkness owing to the failure of the electric light; and similar experiences were numerous. While they were proposing in Exeter to abandon gas for the electric light, other cities were installing gas in place of electricity. Were they in Exeter not going to take warning by what was going on around them? The question, to his mind, really was whether, for the sake of bolstering up the electric light undertaking, they were going to place an extra charge of £480 a year on the ratepayers. He concluded by moving, as an amendment—"That the report of the Joint Committee be not adopted, and that the matter be referred back to the Committee with instructions to negotiate a contract with the Gas Company for lighting the city, other than the portion already lighted by electricity, for a period of five years, on the basis of their tender of April 30, 1906."

Alderman GADD seconded the amendment, and pointed out that by adopting the Gas Company's terms they would save the whole of the capital outlay which would be necessary for installing any improved system of lighting. The difference between the cost of gas and electricity would in five years pay off the cost of installation.

The amendment was defeated by 24 votes to 19.

Alderman DEPREE proposed a further amendment, to the effect that electric lighting should be adopted only for the tramway routes, and that the other streets and the junctions of roads should be lighted by gas. He remarked that to carry out the scheme of the Joint Committee in its entirety would be very costly indeed. In almost every other municipality experience had shown that gas could be obtained cheaper than electricity, and that it was a much better illuminant.

Mr. W. H. TARBET was proceeding to second the amendment when, amid the laughter of the Council, a number of the electric lights in the hall went out. They were immediately switched on again, and the

speaker proceeded; contending that when London and other important places were substituting gas for electricity, Exeter should hesitate to adopt the opposite policy.

Mr. PERRY contended that the main point which the Council should consider was that they were the owners of the electricity works. Whether they were going to pay £400 or £200 more for electricity than gas was not of so much importance as the fact that in regard to electricity they were both the producer and the consumer, and that, even if the figures given by Mr. Campion were correct, it would be to the interest of the city that they should support their own undertaking.

Alderman REED said his contention was that, on an average, lighting by incandescent gas-mantles was not so well maintained as by electric lamps. A test of a nominal 200-candle power gas-lamp showed that it was only giving 94·09 candles. One of the new lamps erected by the Gas Company had also been tested, and proved to be giving a light of only 59 84 instead of 120 candles. The deterioration of electric lamps was not nearly so great.

Alderman H. YEO pointed out that the Gas Company were one of the largest ratepayers in the city, and said if the Council were going to take away from them the public lighting, they might as well shut the gates of the ship canal at once, because of every six ships which went up it five were for the Company.

Mr. CAMPION asked who made the tests referred to by Alderman Reed; and being informed that they were made by the Electrical Engineer, he contended that they were of no value. On the other hand, he said a test made on behalf of the Gas Company showed that one of their 60-candle power lamps was giving light of 68·7 candles, a 120-candle lamp 152 candles, and a 400-candle lamp 439 candles.

The amendment was rejected by 24 votes to 19; and the Committee's recommendations were adopted.

OPENING OF THE GAS-WORKS AT WITHNELL.

The ceremony of formally turning on the gas at the new works of the Withnell Urban District Council was performed on the 30th ult., by Mr. W. B. Park, a member of the Council, in the presence of a numerous company. The works, as our readers may remember, were designed by Mr. Isaac Carr, of Widnes. They are situated at Withnell Fold, and occupy a portion of about two acres of land, acquired for the purpose, adjacent to the Leeds and Liverpool Canal. Their manufacturing capacity, as at present arranged, is 60,000 cubic feet per day; but only two beds of retorts are in use. There is room for another bed, and the addition of this will bring up the productive power to 90,000 cubic feet daily. The retorts, which are Ω-shaped, 21 in. by 15 in., and 9 feet long, are set six in a bed, and heated by Drakes' regenerator furnaces. The coal store, which adjoins the canal, will contain about 250 tons. The condensers are of the vertical atmospheric type; the exhauster has a capacity of 5000 cubic feet per hour; and there are three purifiers, each 8 feet square and 4 feet deep, fitted with Spencer grids and luteless covers. The gasholder, which works in a steel tank, is 50 feet in diameter and 18 feet deep, and has a capacity of 35,000 cubic feet; but arrangements have been made for enlarging it so as to hold twice this quantity. The mains extend for a distance of four miles; and after leaving Withnell Fold a hill 200 feet higher than the works has to be surmounted before Brinscall—about two miles away—is reached. Some 230 slot consumers and 40 ordinary consumers have been connected, and the price provisionally arranged is 3s. per 1000 cubic feet for large consumers, 3s. 6d. for ordinary users, and 22 cubic feet are supplied for a 1d. in the case of slot consumers, who have free fittings and a griller in addition. For cookers, a rent of 1s. per quarter is charged.

At the opening proceedings, Mr. J. Heaton presided, and was supported by Mr. A. Towers (the Chairman of the Gas Committee), Mr. J. W. Carter (the Clerk to the District Council), and Mr. C. Cliffe, of the Sutton and Hooton Gas Company, who has lately superintended the works, of which Mr. T. Houghton is the Manager. Mr. Carter, in an explanatory statement, said that the question of a gas scheme had been before the Council for a long time, and at first the difficulties seemed great that they abandoned the project. Then private speculators so stepped in; but the Council successfully opposed their scheme, and afterwards decided to proceed with one of their own. They obtained the advice of one of the best engineers in the country—Mr. Carr, of Widnes—and had also been fortunate in their Contractors. One matter they had to regret, and that was that the Surveyor (Mr. Beaver), who spent so much time and energy on the work, had not lived to see the completion of the undertaking.

When turning on the gas, Mr. Park expressed the hope that all the inhabitants would encourage its consumption; for upon this, he said, depended the question whether or not the undertaking would have to come upon the rates. A vote of thanks having been accorded to Mr. Park, the party drove to Brinscall and dined there. A number of toasts were honoured; and a pleasant evening was spent.

Record Profits at Fenton.—The net profits of the Fenton Urban District Council's gas undertaking for the past year are the largest on record—£2520, or about £600 more than those for the previous twelve months. Cheaper coal accounts in the main for this gain. The profits, together with an amount to be taken from this year's working, are to be applied to the redemption of a loan from the bank. The price of gas has been reduced 6d. per 1000 cubic feet; and a sum of £900 is to be spent in renewals and extensions of the works.

Gas-Workers' Wages at Rochdale.—Some months ago, the gas-workers under the Rochdale Corporation applied for an advance of 2s. a week in their wages. The application, it is said, affects sixty or seventy men who now receive about 23s. per week, working 55½ hours. An application from the coke-wheelers has also been sent in for a reduction of hours; but this concerns only two men, who now earn 30s. They work 12 hours per day, and have to put in Sunday labour; and they now ask that their hours shall be reduced from 12 to 8 per day. The Gas Committee resolved to obtain information from other towns similarly situated to Rochdale before deciding on the applications.

SEVENTEENTH ANNUAL BONUS DISTRIBUTION

Of the South Metropolitan Gas Company.

Writing in the July number of the "Co-Partnership Journal" of the South Metropolitan Gas Company, Sir George Livesey says: I have the pleasure, on behalf of the Directors, to say that this year's bonus at the rate of 9¾ per cent. on salaries and wages amounts to about £44,000. The cost of working the co-partnership amounts to about £1400 a year, which is borne by the Company. This is the largest bonus ever distributed. The knowledge that the greater part of it will be wisely and rightly used, is very gratifying to the Directors, and I can say will also be to the shareholders.

Having explained the principle on which co-partnership is worked, Sir George asks: Is Co-Partnership the right principle for the conduct of business? I think it is. But even right principles will fail if not honestly and intelligently worked. We have done all we can; and it remains for the co-partners of all ranks to make our co-partnership a continuous success. It is right, however, to state that constant efforts have been made to induce all co-partners not to regard their bonus as a part of their ordinary income; but either to let it accumulate to make a provision for the future, or to use it for some permanent benefit—such as the purchase of a house. Those who withdraw their money or sell their stock without good reason are not permitted to renew their agreements until they adopt habits of thrift by saving a portion of their weekly wages. The results have exceeded all expectation. From the start, nearly half of the total bonus was saved; and the patient and persistent efforts of Directors and officers that have been made during the seventeen years to promote thrift, and the example and encouragement of their fellow workmen, have had the abundant reward of inducing nearly all those who at first withdrew and spent their bonus to save and invest it. Very nearly the whole of the annual bonus is now saved; and some 5000 men in constant employ have invested in the Company's stock, and hold on deposit at interest over £300,000, while a large number have become owners of the houses in which they dwell. There remain a small number of thriftless men; but seeing what has been accomplished, let us hope that they will yet follow the good example of their fellows. But, failing that, we are all determined, and none more so than their fellow workmen, that they shall not injure or interfere with the working or with the continued success of our co-partnership.

It has been suggested by some co-partners that we should now leave the thriftless men who have been the cause of all the trouble to take their course—to stop their agreements, and, in fact, get rid of them. But that is not quite the true co-partnership or Christian spirit. Remember that many earnest co-partners were not so long ago among the thriftless, and, if they had been left to take their course, would have been still in that class; whereas they are now owners of property increasing year by year. This is a great satisfaction and reward to those who have patiently persevered in trying to induce them to alter their course. It is to help in this direction that we ask all co-partners to deposit their certificates with the Company, for which an official receipt will be given. I may add that at any time the certificates can be had on application.

DUNEDIN CORPORATION GAS-WORKS.

The Supply of Coal—Appointment of Consulting Engineer.

According to a copy of the "Otago Daily Times" just to hand, the Dunedin City Council have lately had some interesting questions before them in regard to their gas undertaking.

The first matter related to the purchase of coal for the gas-works; and in moving the adoption of the report of the Gas Committee at the meeting of the Council on the 28th of March, Mr. Walker, the Chairman, said that the consumption at the works had increased, but the storage capacity had not. The Committee had obtained reports and analyses of the West Maitland coals, and decided to recommend the East Greta coal. The conditions at the gas-works made it almost imperative that one of these coals should be obtained at the present time. When the alterations at the works were effected, it was hoped there would be no difficulty in using New Zealand coal. The next matter was a proposal to appoint a Consulting Engineer; and in connection with this Mr. Walker said the Committee had had offers from four of the ablest men in the Australasian colonies. Their testimonials had been closely looked into, and the Committee could come to no other conclusion than that Mr. Robert English was the most suitable man for the office. For the last four years he had been in charge of the Christchurch Gas-Works. Another point was that he could be obtained at very short notice when his services were required. What they purposed doing in connection with the works was this: The Engineer and the Town Clerk had prepared a report on the works to be carried out. The Consulting Engineer would consult with these gentlemen about the works. Plans had been prepared by their own Engineer (Mr. H. B. Courtis), and Mr. English would consult with him, and specifications would be sent to London where tenders would be invited for the work. In connection with the extension of the retort-house and coal-stores, the Committee did not intend to go outside Dunedin in order to get the work done.

In seconding the motion, Mr. Brinsley said he was sorry they could not use the Westport coal; but it should be clearly understood that when the proposed improvements had been effected they would be found to be such that New Zealand coal could be employed at the works. He agreed with the Committee that Mr. English was the best man to select for the office of Consulting Engineer; and he added that Mr. English was a great believer in the Westport coal.

In the discussion which followed, Mr. Connor moved, as an amendment, to delete from the clause of the report relating to the appointment of a Consulting Engineer the words "and when tenders are received the same shall be referred to the Consulting Engineer to

decide as to which is the most eligible." He said he was of opinion that if they referred the tenders to the Consulting Engineer it would belittle their own Gas Engineer and the Town Clerk, who was also an engineer. He submitted that the present Gas Engineer and the Town Clerk were quite able to decide the matter. Mr. Crust seconded the amendment. Mr. Walker said that the word "decide" in the report should have been "report." It was intended that the Consulting Engineer should simply report as to the most eligible of the tenders; not that he should decide upon the most eligible. He asked leave to amend the report by substituting the word "report" for the word "decide;" and this was granted. Mr. Gore characterized it as a slur on their Engineer to appoint another; and it would be money thrown away. If the Engineer could not carry out the proposed work, he was not fit for his position. With regard to the coal, he did not know why the Committee had passed over the lowest tender of all—that for the Pelaw Main coal. Westport coal could be supplied at 21s. 6d. a ton, whereas the East Greta was 21s. 9d. Further, the Westport coal gave better results wherever it was used than any New South Wales coal. He thought the Westport tender should have been accepted. He admitted there was a difficulty in carbonizing it on account of its choking the pipes; but other engineers had used it, and why should it not be used now? It had been proved beyond doubt that it was the richest coal that could be procured for gas-making purposes.

Testimony to the good work done by the Committee was borne by the Mayor, who said that in a matter of spending £50,000 to bring the works up to date it behoved the Committee and the Council to see that the money was spent advantageously. It was not an unusual thing to obtain the opinion of a Consulting Engineer; and at all times Mr. English would act in consultation with Mr. Courtis. In regard to the Westport coal, it was not the object of the Committee to run down a local product. If they could they would have been only too glad to accept that coal. But they could not do so in the present condition of the works, because there was not sufficient storage; and, further, because in the meantime the East Greta coal was the most suitable—that was to say, it carbonized much more quickly than the Westport coal. When the works were in order he believed the Westport coal would be used, and no other. Mr. C. Fiddis said there were men employed at the gas-works who could get 12,000 cubic feet of gas out of a ton of Westport coal, while only 10,000 feet per ton were obtained from the East Greta coal.

Mr. Walker, in reply, said that other engineers might have used the Westport coal; but it had to be remembered that in those days the output was smaller than it was now. All the Committee had desired to do was to get the best coal for the works. The Engineer stated distinctly in his report that East Greta was the cheapest of the three Newcastle coals. He did not propose that this coal should be bought—it was a matter that was left to the Committee; and they decided the best thing to do was to accept the tender of the East Greta Company.

The amendment was negatived, and the report was adopted.

METROPOLITAN WATER BOARD.

Cost of the Arbitrations—The Supply in May.

At the Meeting of the Board last Friday—Sir R. M. Beachcroft in the chair—the Special Arbitration Committee submitted a report dealing with the costs incurred in connection with the arbitrations, together with statements setting out the amounts of the several bills, and the results of the taxation in each case, as well as various comparative and other statements relative to the matter in question. The report showed that the total of the Board's costs was £142,437, while those of the Companies amounted to £92,130, or a combined total of £234,568, as against £250,064 estimated by the Committee. The net payments to the Board of Arbitration amounted to £25,237; but from this total must be taken the sum of £4321, fees returned by Sir Edward Fry and Sir Hugh Owen. The total costs of the arbitration amounted to £255,584. Of the Board's costs, £74,858 was for the Solicitors' bill, and £67,579 fees to expert witnesses. The Committee also reported that, so far as they could ascertain, they had now completed all the subjects falling within their reference, and had carried out the purposes for which they were originally constituted. They therefore recommended that they should be dissolved. The Board agreed to the recommendation. On the motion of Mr. King, the thanks of the Board were accorded to the Committee for the services they had rendered. Sir Melvill Beachcroft, as the Chairman of the Committee, acknowledged the vote of thanks, and observed that, in view of the fact that the arbitration involved a sum of £47,000,000, a quarter-of-a-million spent in law costs was not out of proportion. On the recommendation of the Works and Stores Committee, a tender of Messrs. James Byrom, Limited, of Bury, Lancashire, for £60,278 was accepted for the construction of reservoirs, &c., at Fortis Green, part of the Staines reservoirs communication works, New River district. The usual return relating to the supply of water for May was presented. It showed that the total average daily supply was 219,193,000 gallons; the number of houses, &c., supplied being 1,046,988. The total estimated population was 6,811,098. The mean supply per head per day was 32·2 gallons; the figure for May, 1905, being 34·7 gallons. The total quantity of water in store in impounding reservoirs at the end of the month was 7045 million gallons, against 6910 million gallons at the end of May, 1905.

PLYMOUTH CORPORATION WATER-WORKS.

Progress of the Undertaking.

The members of the Plymouth Corporation paid their annual "fishing feast" visit to the source of the water supply last Wednesday, and duly toasted the immortal memory of Sir Francis Drake, in the water of the Dartmoor stream which that Elizabethan hero diverted for the benefit of the town. The weather was beautifully fine, and there was a large muster of members of the Town Council and officials of the borough. They were joined by Lord Seaton, whose wife, Lady Seaton, is a descendant of the brother and heir of Sir Francis Drake. An object of special interest to the party was a new building at the head of the storage reservoir, containing a Hutchison recorder, which records the depth of water in inches flowing over the weir, as well as the quantity in gallons.

At the customary dinner, the Mayor (Mr. J. Yeo) presided, and proposed the toast of "The Chairman and Members of the Water Committee." He referred to the progress which the water undertaking had made in recent times, and said that ten years ago the gross revenue of the Water Department was £17,000, whereas it was now £31,000. Mr. C. H. Tozer, the Chairman of the Committee, said they hoped to make the undertaking even more profitable than it had been in the past, so as in some measure to reduce the rates.

Responding to the toast of "The Corporate Officers," the Water Engineer (Mr. F. Howarth) spoke of the present condition and the progress of the water-works. He said that in six consecutive days in May there was a rainfall on that part of Dartmoor of 3¼ inches, which meant that over the drainage area of the water-works it was about 400 million gallons—a total weight of (say) 1,750,000 tons. For water-works purposes, these figures had a meaning, to get at which the new recording station had been erected. During the days that rain fell, about one-third ran off. Then the stream steadily dropped to a little above the normal flow at which it was before the rain. It continued at this rate for a month; and then began gradually to fall again, and had so continued up to the present time. This led to the conclusion that the drainage area consisted largely of an underground reservoir. With regard to the financial position of the undertaking, the income in 1905-6 was £32,397—an increase of £1201 over the preceding year. In the last six years, the income had risen by £9098; and in each of the last five years it had never been less than £1000. With this growing income, they had a decreased expenditure for upkeep and administration; the amount for 1905-6 being £7389, or £336 less than in the preceding year. The gross profit in 1905-6 was £22,232, or £2501 more than in the preceding twelve months. Of this amount, £17,724 had to be paid in interest and sinking fund and income-tax; leaving £4508 as the net profit—a decrease of £483. Taking into consideration the difference in the amounts which had to go to interest on suspense accounts in the respective years, there was really an increase of £605 last year in the net profit. The capital expenditure was £4616 for the year—a rise of £2544; but as they were contributing to the sinking fund and paying off mortgages at the rate of £6659 per annum, they were still on the safe side. There was a steady augmentation in the number of supplies, which now reached 19,800. The consumption had decreased from about 6¼ million gallons a day in 1901-2 to 5¼ million gallons in the past year. If the rate per head in the former period had been maintained, the present consumption would be about 6,726,000 instead of 5,500,000 gallons; so that there had been a saving of something like 1¼ million gallons a day. The Water Committee had stuck to the question of preventing waste in the face of both indifference and opposition, and were entitled to much credit for having done so.

DEVONPORT WATER-WORKS TRANSFER.

Scheme for the Distribution of the Purchase-Money.

A circular has been sent to the stockholders in the Devonport Water Company—whose undertaking, as our readers are aware, has been purchased by the Corporation—setting out the terms on which the Directors propose to distribute the assets. The purchase price of the undertaking, as agreed on between the parties and embodied in the award of Mr. A. J. Ram, K.C., the Arbitrator, was £244,000; and it is estimated that with the other assets there will be the sum of £258,000, or thereabouts, available for distribution. In the scheme prepared by the Directors, it is proposed to pay on the various classes of stock as follows: The sum of £136 15s. for every £100 of the £24,000 of 4½ per cent. preference stock, which will absorb £32,820; £121 10s. for every £100 of the £59,836 of 4 per cent. preference stock, which will absorb £72,701; and £173 for every £100 of the £84,800 of ordinary stock (7 per cent. maximum dividend), which will absorb £146,704. These payments will amount to £252,225, and will leave a balance of £5775. It is proposed that out of this there shall be paid any liabilities not yet ascertained, as well as any further costs not otherwise provided for, and also to the Directors and officers any sums in consideration of loss of office and for special services rendered. Any balance which may remain is to be ratably divided among the ordinary stockholders. It is proposed to pay the whole amount due to the preference stockholders as soon as possible after evidence of title has been furnished, and to pay to the ordinary stockholders £170 per cent., retaining £3 until the assets and liabilities are definitely ascertained.

It is provided in the Devonport Corporation Water Act, 1902, under which the sale of the undertaking has been carried out, that the scheme of distribution shall be submitted to a meeting of the proprietors, and that if anyone shall object, the scheme and the objection shall be submitted to Mr. Samuel Wood (of the firm of Messrs. Wood, Drew and Co.), or to some other accountant to be named by the President of the Institute of Chartered Accountants, who shall have power to settle the scheme, and then it is to be binding on all parties. The meeting for the purpose of considering the scheme is to be held to-day. Objection will be made to it on behalf of the Plymouth Corporation, who are owners of 4 per cent. preference stock of the face value of £10,169. The Corporation purchased the stock in different amounts in the years 1894 and 1899, paying in the former year £115 per £100 of stock, and in the latter £133 6s. 8d. and £133 10s. The total cost to the Corporation was £12,797. At the proposed purchase price of £121 10s. for every £100 of the stock, the Corporation will be entitled to receive £12,355 15s. 7d.; so that they are threatened with a loss of £441 5s. 1d. It is contended by them that, in view of the payments to be made on account of the other classes of stock, the suggested price of £121 10s. for the 4 per cent. preference stock is not an equitable arrangement, especially as in the year 1899, when the stock was last purchased by auction, the reserve price was fixed at £125. It is suggested that £125 is the lowest price at which the shares should be repurchased.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We have probably heard the last for some time of the objections by a small, but noisy, section of the community of Dundee to the voting of an honorarium of 100 guineas to Mr. A. Yuill, the Gas Engineer and Manager to the Corporation. The objectors appeared, by deputation, before the Town Council on Thursday. The subject was introduced by the Town Clerk submitting the correspondence he had had with the local branch of the Independent Labour Party, the Trades Council, &c., enclosing resolutions. The Town Clerk said that he had replied to the Trades Council that the honorarium had been paid, and that it was incompetent for the Town Council to rescind their resolutions, unless previous notice were given. The representatives of the ratepayers and the Trades Council having been heard, the deputation withdrew, and the Town Council did nothing in the matter.

At the annual meeting on Tuesday of the Galashiels Gaslight Company, a summary of whose accounts was given last week, the Chairman—Mr. K. Cochrane—said they could congratulate themselves upon having had a fairly prosperous year. The reduction in the price of gas last year (from 2s. 11d. to 2s. 8½d. per 1000 cubic feet) had reduced the profits to some extent, no doubt; but there had been an increased consumption in dwelling-houses and factories—the increase amounting to over 3 million cubic feet. A good deal of expense, which he was glad to say had been met out of revenue, had been incurred in improving the service. They were very much indebted to their Manager—Mr. Francis Scott—who seemed to inspire his subordinates with the same zeal which he himself had for the welfare of the Company.

It was stated at the annual meeting of the Hawick Gaslight Company yesterday by the Chairman—Mr. R. Noble—that the profit for the past year was £3219. A dividend of 10 per cent. was declared, and, as stated last week, the price of gas was reduced from 2s. 8½d. to 2s. 6d. per 1000 cubic feet, which the Chairman regarded as a record price for an inland town like Hawick. The quantity of gas sold during the year was 71,981,400 cubic feet—an increase of over 4 million cubic feet.

The Pittenweem Gas Company have paid a dividend of 10 per cent., the same as last year, and have carried £200 to the reserve fund.

The annual meeting of the Leslie Gas Company was held on Tuesday. The Directors reported a profit of £325, exclusive of £16 brought forward from the previous year. It was agreed to pay a dividend of 7½ per cent., to place £100 to the reserve fund, raising it to £190, and to carry forward £70.

The Directors of the Selkirk Gaslight Company report a statement of affairs and balance-sheet which show a very satisfactory result of the working of the Company. The total make of gas was 35,850,000 cubic feet—an increase of 2,710,000 cubic feet over the previous year, and the largest amount ever made by the Company in one year. The quantity of gas accounted for was 33,205,100 cubic feet. There was a profit on the year's working of £1019. The Directors recommend payment of a dividend of 10 per cent., the placing of £250 to the depreciation account, and of £315 to a surplus account.

The annual meeting of the Lochgelly Gas Company, Limited, was held yesterday. It was reported that the quantity of gas manufactured during the year was 10,180,150 cubic feet—an increase of 2¼ millions. The balance at credit was £563. A dividend at the rate of 5 per cent. was declared. It was decided to erect a new gasholder, to provide for the cost of which the capital of the Company is to be increased by 3000 shares; and the balance which may be necessary is to be borrowed at 3½ per cent. interest.

The annual report of the Directors of the Cupar Gas Company, Limited, shows that another satisfactory year has been experienced. The amount at the credit of the profit and loss account for the year is £1117, to which has to be added £137 brought forward from the previous year; making £1254. The Directors recommend a dividend on the preference stock of 5 per cent.; and on the ordinary stock of 35s. per share—both the same as last year. They also recommend that £300 be applied to depreciation, and the balance of £261 carried forward.

The Motherwell Gas Company held their annual meeting on Thursday, when it was reported that the income for the year, including £1630 brought forward, amounted to £16,633; the profit being £5245. A dividend at the rate of 10 per cent., free of income-tax, was declared.

The annual meeting of the Coupar Angus Gas Company was held on Wednesday. The report of the Manager—Mr. W. F. Vernon—showed that, notwithstanding the installation of electric lighting by one of the larger consumers, the consumption of gas for the year was fully maintained. The reduction in the price of gas and the introduction of prepayment meters and cooking apparatus had added considerably to the number of consumers. The meeting authorized the payment of a dividend of 6 per cent. In recognition of the valuable services rendered by Mr. Vernon, the shareholders voted him an honorarium of nine guineas.

The Dunblane Town Council held a special meeting on Tuesday night to resume consideration of a proposal to adopt the Gas Acts, with a view to the taking over of the undertaking of the Dunblane Gas Company, Limited. A former meeting, called for a similar purpose, was adjourned because of the small attendance of members. Provost Murray expressed regret that again there was not a full attendance, which was necessary under the statute. Mr. R. M'Gregor, the Convener of the Committee, said they were making inquiries which might lead to another and much better result than the purchase of the present Company's undertaking. The National Gas Association were considering the question of floating a Company in Dunblane, with local management. They were prepared to put gas on the market at a very much lower rate than the present Company. His difficulty was that, in purchasing the present works, the community, owing to what they would have to pay for them, could not hope to have a reduction in the price of gas. The meeting was eventually adjourned till Oct. 2. Who is this National Gas Association who are prepared to do such great things?

Public Lighting of Gosport.—The Gosport Gas Company are to again receive the contract for the street lighting in their district; the Gosport and Alverstoke Urban Council having declined the offer by the Provincial Tramways Company to supply electricity at 2½d. per unit. The latter was considered too high a figure for public lighting. To terminate the gas contract, twelve months' notice from either party is requisite; so that the Gas Company are virtually certain of having the supply for the ensuing two years.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 95.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	20—21	−1	5 0 0
160,000	10	,,	7½	Do. 7 p.c.	14¼—15½	..	4 16 9
200,000	5	May 11	7	Bombay, Ltd.. . . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	4¾—5¼	..	5 6 8
50,000	10	Mch. 9	14	Bourne- 10 p.c. . .	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas B 7 p.c. .	16½—17½	..	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	Feb. 22	12½	Brentford Consolidated	263—268	..	4 13 3
300,000	,,	,,	9½	Do. New . . .	200—205	..	4 12 8
50,000	,,	,,	5	Do. 5 p.c. Pref. .	123—128	..	3 16 11
206,250	,,	June 14	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Mch. 9	11¼	Brighton & Hove Orig.	230—235	..	4 15 9
246,320	,,	,,	8¼	Do. A. Ord. Stk. .	165—170	..	4 17 1
460,000	20	Apl. 11	10	British	42—43	..	4 13 0
100,000	Stk.	Feb. 22	6	Bromley, Ord. 5 p.c. .	121—124	..	4 16 9
165,700	,,	,,	4½	Do. do. 3½ p.c. .	92—95	..	4 14 9
500,000	10	May 11	7	Buenos Ayres (New) Ltd.	11¾—12¼	−¼	5 14 3
250,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	90—98*	..	4 1 8
150,000	20	Mch. 9	8¼	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	June 14	10	Cape Town & Dis., Ltd.	15½—16½	..	6 1 3
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.. .	9¾—10¼	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 28	4½	Do. 4½ p.c. Deb. Stk.	98—100*	..	4 10 0
1,443,280	Stk.	Feb. 22	5⅛	Commercial 4 p.c Stk. .	113—115	..	4 10 5
560,000	,,	,,	5	Do. 3½ p.c. do. .	110—112	..	4 9 3
475,000	,,	June 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6½	Continental Union, Ltd.	125—128	..	5 1 7
200,000	,,	,,	7	Do. 7 p c. Pref.	140—145	..	4 16 7
432,070	Stk.	Feb.	5½	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	105—107	..	3 14 9
486,090	10	Jan. 25	11	European, Ltd. . . .	24½—25½	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	18½—19½	..	4 4 8
15,223,235	Stk.	Feb. 8	4⅝	Gas- 4 p.c. Ord. . .	98—99	+½	4 8 11
2,600,000	,,	,,	3½	light 3½ p.c. max. . .	87—89	..	3 18 8
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	108—111	..	3 12 1
4,193,975	,,	June 14	3	Coke 3 p.c. Con. Deb.	86—88	..	3 8 2
258,740	Stk.	Mch. 9	5	Hastings & St. L. 3½ p.c.	100—105	..	4 15 3
82,500	,,	,,	6½	Do. do. 5 p.c.	121—124	..	5 4 10
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	20—21	..	5 4 9
4 940,000	Stk.	May 11	8	Imperial Continental .	177—179	..	4 9 5
473,600	Stk.	Feb. 8	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 28	6	Lea Bridge Ord. 5 p.c. .	121—126	..	4 15 3
561,000	Stk.	Feb. 22	10	Liverpool United A . .	235—237	..	4 4 5
718,100	Stk.	Feb. 22	7	Liverpool United B . .	169—171	..	4 1 10
306,083	,,	June 28	4	L'rpool Unit'd Deb. Stk.	107—109*	..	3 13 5
75,000	5	June 28	5	Malta & Medn., Ltd. .	4¼—4⅜*	+¼	5 5 3
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb..	103—105	..	4 15 3
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	May 31	3½	Monte Video, Ltd. . .	11—12	..	5 16 8
1,675,892	Stk.	Feb. 22	4½	Newc'tle & G'tesh'd Con.	110—112	+1	4 2 7
406,025	Stk.	June 29	3½	Do. 3½ p.c. Deb.	97—99*	..	3 10 8
15,000	10	Mch. 9	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
52,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 11	8	Oriental, Ltd. . . .	147—150	..	5 6 8
600,000	5	Mch. 28	7	Ottoman, Ltd. . . .	6—6¼	..	5 7 8
398,490	5	Apl. 26	7	Primitiva Ord. . . .	6¼—6⅜	..	5 3 8
796,980	5	Jan. 25	5	Do. 5 p.c. Pref. .	5⅜—5½	..	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb. .	95—97	−1	4 2 6
851,070	10	Apl. 26	7	River Plate Ord. . . .	12¼—12⅜	..	5 9 10
300,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	96—98*	..	4 1 8
250,000	10	Mch. 28	8	San Paulo, Ltd. . . .	13¾—14¼	..	5 12 3
70,000	50	July 2	5	Do. 5 p.c. Deb. .	49—51*	..	4 18 0
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	243—245	..	4 1 8
126,106	Stk.	Mch. 9	5½	Shrewsbury Ord. 5 p.c.	114—116	..	4 14 10
70,000	10	May 31	10	South African	15⅝—16⅜	..	6 1 3
6,250,000	Stk.	Feb. 22	5½	South Met., 4 p.c. Ord.	128—130	..	4 4 7
1,895,445	,,	Jan. 11	3	Do. 3 p.c. Deb.	87—89	..	3 7 5
575,000	Stk.	Mch. 9	5½	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—130	..	3 16 11
112,533	,,	Jan. 11	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	May 11	5	Southampton Ord. . .	107—112	..	4 9 3
120,000	Stk.	Mch. 9	6¼	Tottenham A 5 p.c. .	12¼—127	..	4 18 5
363,020	,,	,,	4¼	and B 3½ p.c. .	93—102	..	4 13 2
137,500	,,	June 28	4	Edmonton 4 p.c. Deb.	103—105*	..	3 16 2
182,380	10	June 14	8	Tuscan, Ltd.	10—10½	..	7 12 5
149,900	10	July 2	5	Do. 5 p.c. Deb. Red.	98—101*	+2	4 19 0
30,000	Stk.	Feb. 22	7½	Wands- A 5 p.c. . .	—	..	—
255,636	,,	,,	6¼	worth B 3½ p.c. . .	133—136	..	4 11 11
75,000	,,	,,	5⅛	and C 3½ p.c. . .	110—113	..	4 16 1
69,416	,,	June 28	3	Putney 3 p.c. Deb. Stk.	82—85*	..	3 10 7
745,872	,,	Mch. 9	5⅛	West Ham 5 p.c. Ord. .	106—108	..	4 14 10
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—125	..	4 0 0
193,300	,,	June 28	4	Do. 4 p.c. Deb. Stk.	104—107*	..	3 14 9

Prices marked * are "Ex div."

CURRENT SALES OF GAS PRODUCTS.

Week ending July 7.

It is stated that sales of 90 per cent. benzol have been made in the London market at 9⅜d. net for prompt, and that 90 per cent. toluol has been sold at 1s. 1⅜d. on the same terms. For 60° crude carbolic 1s. 9½d. net has been bid, and London makers are disinclined to accept the price. There is little change in pitch; but a good inquiry continues. 40 to 45 per cent. anthracene stands from 1⅜d. to 1⅝d. per unit. It looks as if sulphate of ammonia has taken a turn for the better. Inquiries are plentiful, and bids are made at higher prices than was the case last week. The prompt price on Beckton terms is from £12 to £12 2s. 6d.

Sulphate of Ammonia. LIVERPOOL, *July* 6.

The business transacted during the week has been of a limited character only. The parcels placed upon the market were less numerous than usual, but owing to slackness of demand they only found buyers at a reduction upon last week's quotations. There were some direct orders, and these constituted the chief requirements during the week, speculators who have to cover sales for the current month having kept strictly aloof. Closing quotations are £11 15s. f.o.b. Liverpool, and £11 12s. 6d. f.o.b. Hull. At Leith not much business is reported, and buyers' ideas are apparently not over £11 15s. In forward delivery, some sales appear to have been made by makers for delivery up to the end of the year at something under £12, while speculators continue to offer abroad at about the parity of prompt prices.

Nitrate of Soda.

This article is firmer for cargoes, and the spot value is 11s. 1½d. per cwt. for ordinary, and 11s. 4½d. for refined.

Tar Products. LONDON, *July* 9.

The market is quiet, but fairly steady; and there has been practically no alteration in prices. Small quantities of pitch continue to be sold from time to time for prompt delivery at low prices by distillers who have some quantity which they do not care to carry over the summer months; but for forward, the market appears to be distinctly firm. The London makers again report having refused 30s. for forward delivery, and are still holding for 32s., though there does not seem to be any chance of their realizing this price just at present. Business is reported on the west coast at fairly good prices for delivery to South Wales from now to the end of the year; but, as a rule, the fuel makers in this district appear to have covered all their requirements over this period, and are only open for next year's delivery, which, however, does not interest distillers at the moment. In creosote, the market remains in about the same position. There is not much London oil offering; most of the makers appearing to be well sold, and not caring to entertain further business except at a very good price, the more especially as the American demand continues good. It is reported that some quantity was offered for delivery from now to the end of the year in sellers' tank-trucks at works London at 2d. per gallon; and business is reported in the Midlands at 1½d. to 1⅝d., according to quality and position, while in Yorkshire manufacturers appear to be pretty well sold to the end of the year. There is very little doing in anthracene; but small parcels change hands from time to time at low prices. Solvent naphtha remains quiet, but fairly steady. There is still a good demand for London stuff; but it is reported that 11d. has been accepted in the North for delivery up to the end of the year. Carbolic acid remains unchanged. Small sales take place from time to time at about 1s. 9d. on the east coast, and this price is also reported to have been paid at the works by home consumers. Crystals remain unchanged, and prices are purely nominal. No actual business of any importance is reported in this article. Toluol remains in about the same position. Whatever quantities offer from time to time are readily taken up at good prices, and 1s. 2d. is reported to have been paid in London for a small quantity. Benzol, 90 per cent., remains quiet, and sales are reported at equal to 9¼d. London; but in 50-90 per cent., the market is very firm, and makers ask 11d. to 1s., according to position.

The average values during the week were: Tar, 15s. to 21s. Pitch, London, 27s. 3d. to 27s. 6d.; east coast, 26s. 3d. to 26s. 6d.; west coast, 25s. 6d. to 25s. 9d. Benzol, 90 per cent., 9¼d. to 9½d.; 50-90 per cent., 10⅜d. to 11d. Toluol, 1s. 1½d. to 1s. 2d. Crude naphtha, 3⅝d. to 4⅛d.; solvent naphtha, 1s. to 1s. 1d.; heavy naphtha, 11⅜d. to 1s. 0⅜d. Creosote, London, 1 15/16d. to 2d.; North, 1½d. to 1⅝d. Heavy oils, 2¼d. to 2⅜d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9¼d. Naphthalene, £5 10s. to £9 10s.; salts, 24s. to 25s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been exceedingly quiet during the past week, and lower prices generally are quoted. The principal Gas Companies maintain their nominal quotation at £12 2s. 6d.; but the actual value of outside London makes upon Beckton terms is from £11 10s. to £11 12s. 6d. In Leith, the market is quiet; and one of the best makes is reported to have been sold at £11 17s. 6d. The closing price is about £11 15s. In Hull, small lots are reported to have been sold at £11 12s. 6d. to £11 13s. 9d.; while in Liverpool, the value may be taken as from £11 13s. 9d. to £11 15s. The market closes quiet; but it is evident that some of the buyers would be prepared to do business for forward delivery at existing price.

Gas Poisoning in Marylebone.—Mr. Schröder held an inquest at Marylebone last Friday on Henry Josiah Ford, a provision merchant, of Kennett Road, Paddington, who was found at his place of business in Lisson Grove with a piece of gas-tubing, leading from the gas-bracket, in his mouth. He had died from gas poisoning. A verdict of "Suicide during temporary insanity" was returned.

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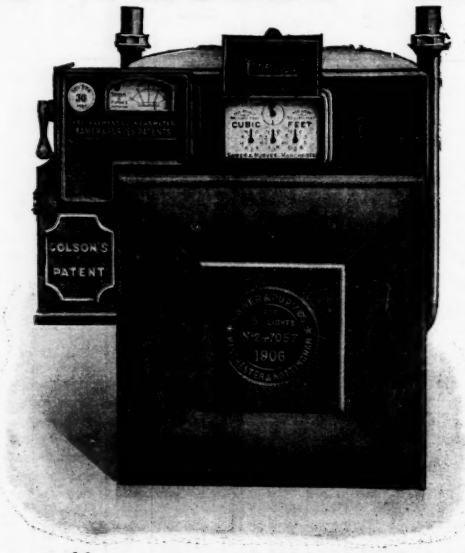

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SAWER AND PURVES

MANCHESTER AND NOTTINGHAM.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Ever since Whit week, the house coal trade in this county has been exceedingly flat. Engine fuel is in constant demand at firm prices. Coal from Yorkshire and the Midlands is being sent into Lancashire in competition with the products of local collieries; but it seems to have a somewhat restricted sale. Demurrage is spoken of as the result here and there. In some instances, however, contracts have been concluded with Lancashire firms. Gas coal and cannel are going out slowly on new contracts. There is no change to report in the prices current of the various classes of coal. The wages question is quiescent at present. There may be, however, some trouble when the eight-hour movement is an accomplished fact; for less coal will be brought to the surface, and wages, at any rate for the "day men," will remain the same. Colliery proprietors may object to paying the same weekly wage bill as at present, with lessened receipts.

Northern Coal Trade.

There has been a good demand for coals generally, and the collieries have had tolerably full work, though the inquiry has been readily met, as the production has returned to its normal fulness. In the steam coal trade, the demand is steady, more especially for export; and prices are well maintained at about 10s. 6d. per ton f.o.b. for best Northumbrian steams, while second-class steams vary from about 9s. 6d. to 9s. 9d. Steam smalls are firm, and command about 6s. to 6s. 1½d.; while higher prices would be quoted if it were not for the duty. In the gas coal trade, there is already some increase in the demand; but it is—as usual at this time of the year—small to that known later, though it is aided, for some of the shipping collieries, by a good shipping demand. For occasional cargoes, the price of Durham gas coals varies from about 9s. to 10s. per ton f.o.b., with sales of fair quantities. As to the contracts, more has been sold forward to some of the French ports; and, at about 9s. 6d. to 9s. 9d., some contracts for considerable quantities of good Durham kinds are believed to have been made. There is more disposition to buy forward for delivery after the end of the coal-tax; and it is expected that some of the foreign customers that were lost by the tax are likely then to return; so that the demand may be much brisker than usual. In the coke trade, there is steadiness; and gas coke as well maintains its price—from 10s. to 10s. 6d. f.o.b. in the Tyne being quoted for good descriptions.

Scotch Coal Trade.

Trade is showing a little better, the foreign demand being strong, now that the northern ports are all open. At home, the holidays are interfering slightly with trade; but this will only be a matter of a week or two, and then, it is anticipated, there will be an improvement. There is already a considerable demand for forward delivery. The prices quoted are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 9d. to 10s., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 321,845 tons—an increase of 54,078 tons upon the preceding week, and of 84,885 tons upon the same week of last year. For the year to date, the total shipments have been 6,663,164 tons—an increase of 770,207 tons upon the corresponding period of 1905.

Oldbury Gas Department.

The statement of accounts in connection with the Oldbury Gas Department for the year to March 31 was issued last Tuesday by the Engineer and Manager (Mr. A. Cooke). It shows that the amount received from the sales of gas during the year was £13,181, and from residual products £3859—the total income being £17,240. The expenditure is set down at £13,015, and includes £8277 for manufacture of gas, £1063 for distribution, &c., and £714 for public lighting and repairs. A sum of £1175 was paid as rent, rates, and taxes. The gross profit was £4224. After repayment of loans and interest, and the transfer of £600 to the general district rate account, the net profit amounted to £631. The total of loans outstanding at the end of the year was £58,888.

The Cost of the New Reservoir at Torquay.—Reference was again made, at the meeting of the Torquay Town Council last week, to the cost of constructing the new Trenchford storage reservoir. Alderman Bovey, formerly the Chairman of the Water Committee, justifying their policy in deciding to make the reservoir, said that in the autumn of 1901 the quantity of water in store was so depleted that they had only ten days' supply in hand. At the time it was reported that the consumption was increasing; and it was computed that in five years an additional supply of 60 or 70 million gallons per annum would be required. In these circumstances, the Committee, with one exception, were unanimous in deciding to undertake the construction of another reservoir. As to the estimate of the cost, £22,000 was perhaps not enough; but the prices on which it was based were ample, and the great excess in the expenditure was very disappointing. Mr. Ingham, the Water Engineer at the time, took every precaution to ascertain what would be a good bottom for the trench. He found solid rock at an average depth of 15 feet, and he added 10 feet for contingencies. He would not have been justified in adding another 20 or 30 feet; and it was impossible then to foresee what had turned out to be necessary. Although the expenditure had proved to be so largely in excess of the estimate, he believed that the right thing had been done by the Water Committee in deciding to construct the reservoir. Alderman Beavis contended that if more storage was necessary it could have been provided, at one-fourth of the cost of the new reservoir, by raising the dam of the Kennick reservoir. Mr. Pike, while criticizing the policy of the Water Committee with reference to the new reservoir, said the plan suggested by Alderman Beavis would not have answered, as it would not have been safe to raise the dam of the Kennick reservoir.

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
Blackburn	1,250,000	Winnipeg, Man.	500,000	Malton	150,000
Windsor St. Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Smethwick	500,000
Saltley Works, Birmingham	2,000,000	York	750,000	Gravesend	300,000
Colchester	300,000	Rochester	500,000	Pernambuco, Brazil	125,000
Birkenhead	2,250,000	Kingston, Ont.	300,000	Duluth, (Second Contract)	300,000
Swindon (New Swindon Gas Co.)	120,000	Crystal Palace District	2,000,000	Leicester (Second Contract)	1,000,000
Saltley, Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Newport (Second Contract)	250,000
Windsor St., Birmingham (Second Contract)	2,000,000	Caterham	150,000	Brockville	250,000
Halifax	1,000,000	Leicester	2,000,000	Toronto (Third Contract)	750,000
Toronto	250,000	Enschede, Holland	150,000	Montreal, Ont. (Second Con.)	1,800,000
Ottawa	250,000	Buenos Ayres (River Plate Co.)	700,000	Toronto (Fourth Contract)	1,000,000
Lindsay (Remodelled)	125,000	Burnley	1,500,000	Hamilton, Ont.	400,000
Montreal	500,000	Kingston-on-Thames	1,750,000	Rochester (Third Contract)	1,600,000
Toronto (2nd Cont., Remodelled)	2,000,000	Accrington	500,000	Leeds (Second Contract)	900,000
Belleville	250,000	Tonbridge	300,000	Buenos Ayres (Primitiva Co.)	1,200,000
Ottawa (Second Contract)	250,000	Stretford	500,000	Buenos Ayres (New Co.)	1,200,000
Brantford (Remodelled)	200,000	Oldbury	300,000	Christchurch, N.Z.	300,000
St. Catherines (Remodelled)	250,000	Todmorden	500,000	Rochdale	1,600,000
Kingston, Pa.	125,000	Saltley, Birmingham (Third Contract)	2,000,000	St. John's, Newfoundland	250,000
Peterborough, Ont.	250,000	York (Second Contract)	750,000	Brantford (Second Contract)	400,000
Wilkesbarre, Pa.	750,000	Rochester (Second Contract)	500,000	Smethwick (Second Contract)	500,000
St. Catherines (Second Cont.)	250,000	Newport (Mon.)	250,000	Pontypridd	250,000
Buffalo, N.Y.	2,000,000	Tokio, Japan	1,000,000	Montreal (Third Contract)	1,800,000
		Newcastle-on-Tyne	1,800,000	Guelph, Ont.	350,000
		Leeds	1,800,000	Buenos Ayres (River Plate Co.) Second Contract	750,000
				Belgrano (River Plate Co.)	500,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

Electric Light Loss at Bath.—After crediting the Bath Electricity Department with £4400 for street lighting, the past year's trading of the undertaking shows a loss of £338. No allowance has been made for depreciation on the capital expenditure of £160,000.

Madrid Gas Supply.—According to some particulars given in "Industria," the Madrid Gas Company sold, during the year 1905, from their six works, 471 million cubic feet of gas; and the receipts amounted to 3,346,010 pesetas (£133,840), against 3,261,305 pesetas (£130,452) in 1904—an increase of 84,705 pesetas (£3388). There was an improvement in revenue from the sale of coke and residual products last year.

The Liverpool Lamplighters' Holiday.—Reference was made at last Wednesday's meeting of the Liverpool City Council to the unfortunate state of affairs which arose through the non-lighting of the lamps for three nights during the "lamplighters' holiday," as reported in last week's "JOURNAL;" but the debate had not been concluded when the Council arose, so that it will be resumed at the August meeting. The motion under discussion is that the minutes of the Tramways and Lighting Committee referring to the lamplighters' holiday be referred back, so that the men may get, with their holiday, the "usual good-conduct bonus," which it is said has been denied them.

Gas Poisoning Case at Newcastle.—As the result of an inquest at Newcastle-on-Tyne, the Jury found that Mr. A. Durham Garbutt, a house and estate agent, had died from failure of the heart's action, owing to gas poisoning, but that how he inhaled the gas there was no evidence to show. The evidence showed that deceased, who was found in his office with the gas turned on but not lighted, had, to cure a headache, been taking some powerful drugs, which would have a very depressing effect upon the heart. The doctor said that deceased had apparently hurried for a train and lost it, and had then returned to his office and taken one of the powders. Afterwards he had turned on the gas and attempted to light it; but being exhausted by his run for the train, the powder had quickly taken effect on the heart, and he had collapsed in the chair without being able to light the gas.

Workman Drowned in a Tar and Liquor Tank.—A sad fatality occurred in the works of the Motherwell Gas Company on the morning of Friday, the 29th ult. A man named William Sharp, who had charge of the sulphate plant, was discovered to be absent from his post. It was known that he had been at his work, because his coat was hanging in its usual place, and his breakfast, wrapped in a handkerchief, lay close by. A long search in the works proved fruitless, until one of the men climbed a ladder and looked into the tar and liquor tank. There he observed a man's cap floating on the surface of the contents. Grappling-irons were brought into use, and Sharp's body was recovered. The tank is on the top of iron pillars which are 20 feet in height. To reach the interior, a manhole cover has to be lifted; and this was found to be off. It is stated that the deceased had no occasion to be near the tank that morning.

Lighting and Water Supply of Honolulu.—The town of Honolulu is lighted by electricity; but during the past year gas-works have been started and mains laid in many directions—the principal ones being 2-inch pipes with a high-pressure system. Crude oil is used for making the gas, for which there is a considerable demand for use in stoves mostly fitted with coin-in-the-slot mechanism. A large reservoir, of 450 million gallons capacity—a most important addition to the public water-works system—is in course of construction, and will probably be in working order by the middle of next year. Honolulu at present obtains its water by gravity from mountain water stored in reservoirs, as well as from artesian wells, whence it is raised by pumps to reservoirs and tanks at suitable high levels. With the new reservoir it is expected to have a constant supply sufficient for all purposes, without the help of the existing pumping-stations.

Gas-Works Extensions at Rothwell.—The Rothwell Urban District Council, who are being advised by Mr. A. T. Harris, of Market Harborough, are extending their gas undertaking. At present there is no supply available in nearly half the streets and roads of the district; the mains in most instances being confined to the older portions of the town. Out of 900 houses in the urban area, only 260 are supplied with gas. New mains are to be laid, and in some cases larger ones substituted for those at present in position. Mr. Harris says that owing to the adoption of suction gas for power purposes by most manufacturers in the town, the output of gas has received a severe check; and unless something is done to at least make up the consumption lost in that direction, the undertaking will become a bigger charge on the rates than hitherto, in consequence of the income not being sufficient to meet interest and repayment of loan charges, in addition to working expenses. Some development of the consumption is therefore absolutely necessary.

Municipal Loans at Gainsborough.—The Gainsborough Urban District Council, at their meeting last week, considered a letter from the Public Works Loan Commissioners, to the effect that, while they agreed to a request for a loan of £2171, having regard to the large outstanding liabilities of the Council they had great hesitation in granting the loan; and in the event of a further application being made, the matter would have to be seriously considered. With the knowledge that several large loans will have to be negotiated in the near future, the letter, it is said, created something like consternation in the Council. The Accountant had prepared a special report dealing with the matter, and pointing out that the attitude of the Commissioners was a very serious thing, as it was much cheaper to obtain money from the Commissioners than through agents. The outstanding liabilities only amounted to £46,997, a sum very much under one year's assessable value of the district. The capital debt of the Gas Department, he added, was £90,292; and it was possible that the Commissioners had put the two debts together. During the last two years, the Council had reduced their capital debt by £4013. Mr. Dixon, the Chairman of the Finance Committee, said that the outstanding loans were small. The gas undertaking was paying its way independently of the rates. The general opinion was that the financial position of the town was very good; and it was decided to communicate with the Commissioners.

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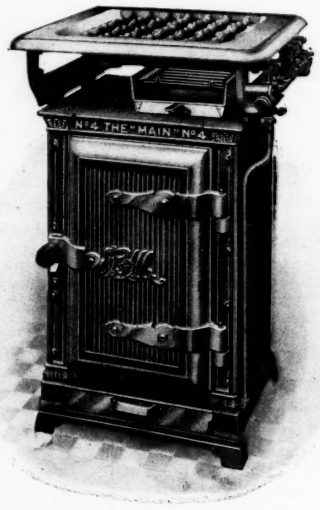

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Water Scheme for Middlewich.—The sanction of the Local Government Board has been received for the borrowing of £11,750 (for 30 years), £1350 (for 50 years), and £1222 (for 15 years) for carrying out a complete water scheme for Middlewich, in respect of which an inquiry was held some weeks ago, as reported in the "JOURNAL" at the time. The new supply will be drawn from Delamere.

Salford Gas Supply.—The annual report of the Salford Gas Committee shows that there has been a considerable increase in the number of consumers and in the sale of gas. The coal and cannel carbonized during the year amounted to 158,217 tons; and the quantity of gas made was 1,604,974,000 cubic feet, of an average illuminating power of 19·45 standard candles. The receipts from residuals were not equal to those of the preceding year.

The Welsbach System for the Public Lighting of Todmorden.—The Welsbach incandescent gas-light is to be immediately installed throughout Todmorden; every lamp in the town being now in process of conversion to the system. There will be about 100 three-light clusters and 600 single-burner sets, all fitted up complete with Welsbach-Kern burners and mantles. For lighting purposes, the Simmance and Abady flash torch will be used.

Salisbury and the Milford Water-Works.—Mr. H. P. Boulnois held an inquiry a few days ago, on behalf of the Local Government Board, into an application by the Salisbury Town Council for sanction to borrow £5802 for the purposes of water supply, including the purchase of the undertakings of the Milford Water-Works Company and Messrs. Coombs and Lywood. It was pointed out by the Surveyor that the Council wished to have the whole of the water supply of the city under their control; and the Inspector said he thought they were quite right in trying to get these small concerns into their hands.

Uxbridge Suffocation Case.—In the "JOURNAL" for the 26th ult. (p. 941), we recorded the finding of the wife and two young children of Mr. E. M. Williams, a resident of Uxbridge, dead in their house, and Mr. Williams suffering from symptoms of suffocation, to which he succumbed two days after the discovery was made. The gas-pipes in the room had been disconnected, and the gas was escaping; and it was at first thought that the fatality had been caused by gas. At the Coroner's investigation, however, it transpired that the mouths of the wife and children were covered by wadding, which it was alleged had been saturated with chloroform; and a letter written by Williams to his mother gave evidence that the unfortunate man was insane, and had deliberately taken the lives of his family and committed suicide.

Nottingham Water Supply.—In their annual report, the Nottingham Water Committee state that the revenue for the past twelve months amounted to £2315 more, and the expenditure to £266 more, than in the preceding year. After paying the annuities and interest on loans and consolidated stock, and the annual contributions to the different sinking funds, the ultimate balance of profits amounts to £7272. This the Committee have carried forward to the account for depreciation, renewals, Derwent Water Scheme, compensation to workmen under the Workmen's Compensation Act, 1897, and other purposes, making that fund £32,912. On March 25 last, there were 74,223 houses supplied, while other supplies numbered 50,050; making a total of 124,273. The estimated population served was 334,003.

The Ilfracombe Gasholder Accident.—At the Barnstaple County Court recently, Mr. A. F. Seldon, representing Ethel Sanders, the widow of the mason who was killed at the Ilfracombe Gas Company's works in March last by the fall of portions of the framing of a gasholder he was removing, explained that the Company had paid £150 into Court, and this sum, with £10 costs as agreed, his client was prepared to accept. There were five young children, and he asked for an order for £50 to be given to the widow, and the remaining £100 to be paid to her in weekly instalments of 2s. 6d. in respect of each child; these payments to commence when the Registrar was satisfied that the fund subscribed by the people of Ilfracombe for the widow and children had been exhausted. Mr. R. M. Rowe, for the Gas Company, consented; and the order asked for was made.

East Surrey Water Company.—The annual general meeting of this Company was held on the 22nd ult.—Mr. P. Riddock in the chair. The Directors' report showed that in the year ending the 25th of March there had been an addition of 692 customers and an extension of mains by 11¾ miles. The profit, with the balance (£1921) brought forward, was £28,967, out of which the Directors had placed £2680 to the renewal and contingency fund, the total of which at the close of the year was £10,230. Interim dividends of 2½, 3½, and 5 per cent. had been paid; and they recommended final dividends of like amounts (less income-tax), after payment of which there would be a balance of £2615 to be carried forward. The report was adopted. At the close of the ordinary business, the meeting was made special to enable the Directors to obtain authority to issue 700 additional ordinary £10 shares. Mr. A. E. Cornewall-Walker, the Company's Engineer, Manager, and Secretary, having produced a copy of the conditions, they were passed as correct, and the necessary sanction for raising the new capital was given.

Stockport Reservoir Dam.—Nine months ago the construction of the dam for the Kinder reservoir of the Stockport Corporation was stopped, as it was found that to reach a safe foundation it would be necessary to go much lower than was originally intended, and that the cost of doing this would very largely exceed the estimate. It appears that the Water Committee have consulted several engineering experts, and they expect to be able shortly to make a statement to the Council. There is no intention of abandoning the scheme; and there are hopes that the difficulties will be overcome at less cost than was expected. The Committee have been advised to substitute an earth dam for the stone one. If the former is constructed, it will have a greater area, but less depth, than a stone dam. The water-works scheme was originally estimated to cost £750,000. It is to be in three sections—the first consisting of the reservoir on the Kinder, the second of one on the Sett, and the third to be carried out at Hollingworth Clough. The complete scheme is designed to provide Stockport with 4 million gallons of water a day and 2 million gallons of compensation water.

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Serious Explosion at the Coventry Gas-Works.—According to a telegram received from our local correspondent yesterday afternoon, an alarming explosion at the Coventry Gas-Works resulted in Mr. Joseph Winstanley, the Works Manager, George Taylor, and Edward Howard, retort-house foremen, being seriously burnt. The explosion occurred in the purifier-house, which was damaged by fire. The flames were successfully subdued by the energetic action of the Fire Brigade, though not without accident to several of the members.

Rushden and Higham Ferrers New Water-Works.—The new water scheme for Rushden and Higham Ferrers, which has taken three years to complete, and has cost some £100,000, was formally inaugurated on Monday of last week. The works are situated in the Sywell Valley (where there is an apparently well-nigh inexhaustible supply of water), and include a reservoir having a capacity of 230 million gallons, or sufficient for about 300 days. Mr. R. E. Middleton was the Engineer, and Mr. A. E. Nunn the Contractor; and at the luncheon which followed an inspection of the works both were heartily complimented on the manner in which everything had been carried out. Acknowledgment was also made of the way in which the Resident Engineer, Mr. Wilson, had fulfilled his duties.

A Gas Company's Opposition to an Electricity Scheme.—The Ravensthorpe Urban District Council, being of a "progressive" turn of mind, are desirous of carrying out a scheme which will enable the dwellers in their district to enjoy a supply of electricity for lighting and power purposes; and they have applied to the Local Government Board for sanction to borrow £2650 to defray the cost of a sub-station and cables. The Mirfield Gas Company, however, whose works are in Ravensthorpe, being large ratepayers, view the matter from quite a different standpoint; and at the local inquiry, the Chairman (Mr. Marmaduke Fox) strongly opposed the application. He maintained that the scheme would never pay, as there was only a small percentage of people who would go to the expense of lighting their dwellings by electricity. The Gas Company, he said, had only one private consumer whose annual account came to more than £15; and nearly all their customers used penny-in-the-slot meters. Besides, the Company had reduced their charge of 3s. per 1000 feet of gas by allowing a discount of 20 per cent. instead of 10 per cent. as formerly.

Suicide in a Water-Works Reservoir.—No doubt it is too much to expect that an unfortunate man whose mind is so far unhinged as to permit him to contemplate the terrible step of self-destruction, will have consideration for others in his choice of means to accomplish the deed; but nevertheless one cannot help regretting that water-works reservoirs should ever be put to such a use. Some days ago, the body of a man (in a greatly decomposed state) was taken from one of the Bradford reservoirs. The deceased had been missing since November last; and the Coroner's Jury returned a verdict of "Suicide while of unsound mind." During the inquest, the question of contamination of the water was raised; and the Engineer, Mr. James Watson, addressing the Jury, said it was chiefly a matter of sentiment. He pointed out that the reservoir, when the body was taken out of it, contained no less than 124 million gallons of water—that was to say, 1240 million pounds. The body of a man—and bodies were largely constituted of water, the organic matter not being very great—consisted of 140 lbs. or 150 lbs. of flesh, bone, and water. Let them imagine this in relation to the 1240 million pounds of water. To cut the water off, by emptying the reservoir, from the thousands of people dependent upon it, would militate against their comfort and probably their health, and would be a loss to the ratepayers of £3725. He hoped the public would not rush to the conclusion that their drinking water was contaminated by reason of this accident, because, in his opinion, it was not so in any way whatever.

The East Surrey Water Company are offering for sale by tender 700 ordinary shares of £10 each.

The South Metropolitan Gas Company have placed a contract for a complete sulphate of ammonia handling plant with the Chain-Belt Engineering Company, Derby, who are also erecting coal-handling plant for the Grays Gas Company.

An enjoyable day was spent by the employees of the Devonport Corporation Gas Department on Saturday week, when they had their annual outing. The party drove by way of Yealmpton to Ivybridge. Mr. J. W. Buckley, the Engineer and Manager, presided at the tea, which was served at the latter place. This was the first occasion on which the chief of the department had taken part in the excursion; and general satisfaction was expressed at his presence.

The Atherstone Gas Company, lately incorporated, have, under the advice of their Manager (Mr. H. Haddock), been reorganizing their plant, comprising a new governor-house, exhauster, engine, and tar storage-tank and power-pump. Messrs. Biggs, Wall, and Co., were the Contractors for the exhauster, tar storage-tank, and pump. The Directors have signified their appreciation of Mr. Haddock's services by voting him a substantial increase in his salary.

Messrs. Clayton, Son, and Co., Limited, have obtained an order for two three-lift gasholders for the Antwerp station of the Imperial Continental Gas Association. They are each 181 feet in diameter, and when fully raised will be 100 feet high, and be capable of holding 2½ million cubic feet of gas. The firm have also, as mentioned elsewhere, been successful in obtaining an order from the Leeds Corporation for about 11¾ miles of welded steel pipes, varying in length from 9 to 18 feet, and 33 inches internal diameter.

The employees at the Warrington works of the Richmond Gas Stove and Meter Company, Limited, had their annual excursion on Saturday, the 30th ult., when upwards of 1200 of them were conveyed in two special trains to Blackpool. On their arrival they divided, after partaking of refreshments, into small parties, and spread in various directions. The weather was beautifully fine and bracing; and after a most enjoyable day spent in driving, boating, and visiting the various places of amusement, the return journey was commenced in good time. The general opinion was that the outing was one of the most enjoyable that have taken place in the history of the Company.

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The new pumping-station for supplying the city of Schenectady is operated by electric motors, and is capable of pumping 24 million gallons of water per day against a head of 110 lbs.

Last Saturday week the employees of Messrs. J. & W. B. Smith held their annual outing-dinner at the "Wheatsheaf" Hotel, Virginia Water. Advantage was taken of the occasion to present their principal, Mr. J. G. Watkinson, with a handsome rose bowl and vases to celebrate his silver wedding (which takes place this month) and as a token of the esteem and regard in which he is held by the employees. The presentation was made by Mr. W. D. Cork, one of the firm's oldest representatives, on behalf of the staff. In a short reply of thanks, Mr. Watkinson said he was very agreeably surprised with the gift, and was grateful for the kind remarks, and also for the good feelings shown by the staff towards his wife and himself.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHARGE OF SHOW ROOM. No. 4620.
JUNIOR, GAS AND WATER OFFICE. No. 4619.

Report by Lighting Expert.

ANNFIELD PLAIN URBAN DISTRICT COUNCIL.

Situation Wanted.

INSPECTOR. Advertiser, Islington.
REPRESENTATIVE OF GAS APPLIANCES COMPANY. No. 4622.

Stocks and Shares.

ALDERSHOT GAS AND WATER COMPANY. July 17.
BARNET GAS AND WATER COMPANY. July 17.
COLOMBO GAS AND WATER COMPANY. July 17.
EAST SURREY WATER COMPANY. July 27.
RHYMNEY AND ABER VALLEYS GAS AND WATER COMPANY. New issue. Applications by July 11.

TENDERS FOR

Coal and Cannel.

CLACTON GAS DEPARTMENT. Tenders by July 18.
GOSPORT GAS COMPANY. Tenders by July 21.
HAVERFORDWEST GAS DEPARTMENT. Tenders by July 17.

Mantles, Chimneys, and Globes.

WEST HAM BOROUGH COUNCIL. Tenders by July 16.

Oil for Gas Making.

LEEDS GAS DEPARTMENT. Tenders by July 23.

Sulphate Plant.

BANGOR (Co. DOWN) GAS DEPARTMENT. Tenders by July 31.

Tar and Liquor, &c.

ROTHERHAM GAS DEPARTMENT. Tenders by July 18.

BOOKS AND LEAFLETS

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A LEAFLET ON SULPHATE OF AMMONIA: ITS SOURCE; RELATIONSHIP TO SOIL; EFFECT ON PLANTS.—By H. H. COUSINS, M.A., South-Eastern Agricultural College, Wye. *Price* 7*s.* 6*d. per* 100; £3 *per* 1000.

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WANTED, in a Gas and Water Works Manager's Office, a SMART YOUTH, used to the General Routine of the Department. Must be neat Tracer, and familiar with Ordnance Survey Maps.
State full Particulars of past Experience, Age, and Salary required, to No. 4619, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE Urban District Council of Annfield Plain require the services of a Competent Person to REPORT on the QUESTION OF THE LIGHTING of their District by Gas, for both Public and Private purposes.
Particulars may be obtained on application to the undersigned not later than the 21st of July, 1906.
By order,
T. L. Watchman,
Clerk to the Council.
Council Offices, Annfield Plain,
July 6, 1906.

WANTED, by a large Suburban Gas Company, an Experienced and Smart Man to TAKE CHARGE of their Principal Show-Room.
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LEEDS CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for the supply of 2000 Tons of GAS OIL for the Manufacture of Carburetted Water Gas, for a period of One Year, commencing on the 1st of September next.
Specification and Conditions of Tender may be obtained on application to the undersigned.
Tenders and Samples, addressed to the Town Clerk, and endorsed "Gas Oil," must be delivered at the Town Hall, Leeds, on or before Monday, the 23rd inst.
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. Townsley,
General Manager.
Gas Offices, East Parade,
Leeds, July 7, 1906.

CLACTON URBAN DISTRICT COUNCIL.

THE above Council invite Tenders for the supply and delivery of about 4500 Tons of best Screened GAS COAL at Clacton on-Sea in quantities as may be required during the ensuing Twelve Months.
Particulars and Form of Tender may be obtained upon application to the Engineer, Mr. Sydney Francis, Assoc.M.Inst.M.E., Town Hall, Clacton-on-Sea.
Tenders, sealed and endorsed "Tender for Coal," to be delivered to the undersigned not later than Four o'clock p.m. on Wednesday, the 18th of July next.
The Council do not bind themselves to accept the lowest or any Tender.
Geo. T. Lewis,
Clerk to the Council.
Town Hall Buildings,
Clacton-on-Sea,
July 3, 1906.

COUNTY BOROUGH OF WEST HAM.
(Education Department.)

THE Education Committee of the West Ham Borough Council invite TENDERS for the Supply for Twelve Months of—
INCANDESCENT GAS-MANTLES.
GLASS CHIMNEYS.
GLASS GLOBES.
Particulars may be obtained on application to the Committee's Architect, Mr. William Jacques, A.R.I.B.A., of 2, Fen Court, E.C., on or before Friday, the 13th inst.
Tenders, on the Form and in the Envelope supplied, to be delivered to the Committee at 95, The Grove, Stratford, on Monday, the 16th inst., at Six p.m.
The Committee will not be bound to accept the lowest or any Tender.
By order,
Fred. E. Hilleary,
Town Clerk.
95, The Grove,
Stratford, E.,
July 4, 1906.

TO COLLIERY PROPRIETORS.

THE Corporation of Haverfordwest invite TENDERS for the supply of about 1400 Tons of Double Screened GAS COAL of the very best quality, to be delivered at the Haverfordwest Railway Station or at the Gas-Works Quay, Haverfordwest, by Water communication, in quantities as required by the Gas Manager during the Year commencing on the 1st of September, 1906.
Tenders by Tuesday, the 17th day of July, 1906.
Forms of Tender and further Particulars of
R. T. P. Williams,
Town Clerk.
Council Chamber, Haverfordwest,
July 2, 1906.

GOSPORT GAS AND COKE COMPANY.
TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of 8000 Tons of GAS COAL for delivery from the 1st of August, 1906, to June 30, 1907.
Specification and Form of Tender may be obtained from Mr. W. H. Adams, Engineer, Gas-Works, Gosport.
Tenders, endorsed "Tender for Gas Coal," to be sent to me not later than the 21st of July next.
The Directors do not bind themselves to accept the lowest or any Tender.
Alfred Loach,
Secretary.
Gas Offices, 142, High Street,
Gosport, June 27, 1906.

URBAN DISTRICT OF BANGOR, CO. DOWN.

THE Council of the above Urban District invite TENDERS for the supply and erecting complete of a SULPHATE OF AMMONIA PLANT.
Full Particulars can be had at the Gas-Works from the Manager, Mr. B. Mitchell.
Sealed Tenders, endorsed "Sulphate Plant," must be delivered at my Office not later than Twelve o'clock noon on Tuesday, July 31.
The lowest or any Tender not necessarily accepted.
James Milliken,
Town Clerk.
Town Hall, Bangor,
Co. Down, July 4, 1906.

COUNTY BOROUGH OF ROTHERHAM.

THE Corporation are prepared to receive OFFERS for the purchase of the surplus GAS TAR and AMMONIACAL LIQUOR produced at their Gas-Works during the ensuing Year.
Forms of Tender and Specification may be obtained upon application to the Engineer and General Manager, Gas-Works Offices, Frederick Street, Rotherham.
Offers, endorsed "Gas Tar or Ammoniacal Liquor" respectively, to be sent to me not later than the 16th inst.
By order,
W. J. Board,
Town Clerk.
Town Hall, Rotherham,
July 3, 1906.

EAST SURREY WATER COMPANY.
SALE OF ORDINARY SHARES BY TENDER.

NOTICE is Hereby Given, that it is the intention of the said Company to SELL BY TENDER SEVEN HUNDRED ORDINARY SHARES OF £10 EACH of and in the East Surrey Water Company. The last day for the reception of Tenders will be Friday, the 27th day of July next, at Twelve o'clock at noon.
Forms of Tender, with Particulars of Sale and Conditions of Tender attached, can be had upon application at the Company's Office, Redhill, Surrey.
By order,
A. E. Cornewall-Walker,
Secretary.
Redhill, Surrey, June 22, 1906.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
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By Order of the Directors of the
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